

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report							
RSY Pad: RSY 40 Use 2				Soil Origin: TU-108B ESU			
Data attached and submitted by: Amy Mangel				Data Report Submittal Date: 1/28/2021			

Systematic Soil Sample Data: RSY 40 Use 2							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU108B-001	1	Systematic	11,030	15,359	0.0949	-0.0122	-0.0974
HPPG-ESU-TU108B-002	2	Systematic	11,208	15,359	0.309	-0.00455	N/A
HPPG-ESU-TU108B-003	3	Systematic	10,683	15,359	0.366	0.000597	N/A
HPPG-ESU-TU108B-004	4	Systematic	11,342	15,359	0.362	-0.0239	N/A
HPPG-ESU-TU108B-005	5	Systematic	11,099	15,359	0.331	-0.0135	N/A
HPPG-ESU-TU108B-006	6	Systematic	11,088	15,359	0.411	0.0198	N/A
HPPG-ESU-TU108B-007	7	Systematic	11,606	15,359	0.543	0.000	N/A
HPPG-ESU-TU108B-008	8	Systematic	11,582	15,359	0.370	0.00236	N/A
HPPG-ESU-TU108B-009	9	Systematic	11,215	15,359	0.279	-0.0143	N/A
HPPG-ESU-TU108B-010	10	Systematic	11,153	15,359	0.264	-0.00569	N/A
HPPG-ESU-TU108B-011	11	Systematic	11,179	15,359	0.355	-0.0198	0.164
HPPG-ESU-TU108B-012	12	Systematic	11,304	15,359	0.380	-0.00404	N/A
HPPG-ESU-TU108B-013	13	Systematic	11,132	15,359	0.488	0.0281	N/A
HPPG-ESU-TU108B-014	14	Systematic	10,995	15,359	0.376	0.0180	N/A
HPPG-ESU-TU108B-015	15	Systematic	11,233	15,359	0.302	-0.00615	N/A
HPPG-ESU-TU108B-016	16	Systematic	11,155	15,359	0.363	0.0233	N/A
HPPG-ESU-TU108B-017	17	Systematic	10,091	15,359	0.325	-0.0340	N/A
HPPG-ESU-TU108B-018	18	Systematic	11,287	15,359	0.361	0.0275	N/A
HPPG-ESU-TU108B-019	19	Systematic	11,263	15,359	0.386	-0.0511	N/A
HPPG-ESU-TU108B-020	20	Systematic	10,830	15,359	0.451	-0.0425	N/A
HPPG-ESU-TU108B-021	21	Systematic	10,852	15,359	0.155	-0.0395	0.138
HPPG-ESU-TU108B-022	22	Systematic	11,035	15,359	0.433	0.0159	N/A
HPPG-ESU-TU108B-023	23	Systematic	10,840	15,359	0.444	0.00107	N/A
HPPG-ESU-TU108B-024	24	Systematic	11,305	15,359	0.497	-0.0542	N/A
HPPG-ESU-TU108B-025	25	Systematic	12,017	15,359	0.313	0.0120	N/A
Soil Systematic Sample Statistics					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
					Maximum	0.543	0.0281
					Mean	0.3584	-0.0071
					Median	0.363	-0.00460
					Minimum	0.0949	-0.0542
					Standard Deviation	0.0982	0.0238
							N/A

Biased Soil Sample Data: RSY 40 Use 2							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU108B-B-001	1	Biased	10,480	15,658	0.188	-0.0546	-0.112

CPM Counts per minute

pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11172020-PG-ROV-313	11/17/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11212020-PG-JSS-332	11/21/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11212020-PG-JSS-330	11/21/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11232020-PG-JSS-338	11/23/2020	3x3	08/06/2021	106853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 40 Use 2
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 33 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. This RSY pad was partially full, which is why the number of scan data points is smaller than normal. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 33 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-46. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 43-78). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for <sup>87</sup> Sr. Strontium-90 results are also included in the TestAmerica sample results report (pages 47-81). Samples HPPG-F-041 and HPPG-F-042 are field duplicates, correlating to systematic samples -011 and -016. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 82-97). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
<b>Conclusions:</b>  In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.  RSY 40 Use 2 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-108B ESU.  APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-108.

## Soil Scan Statistics

Statistical Summary

Dataset		PG-RSY-40-U2				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	29.06	14.67	14.04	3.92
ROI-06		59.13	136.30	98.75	99.20	11.35
ROI-07		46.10	109.24	76.22	76.16	9.63
ROI-08		76.17	167.39	122.58	122.27	13.20
ROI-10		1,959.24	2,775.91	2,435.64	2,449.92	130.98

Statistical Summary Reference Background

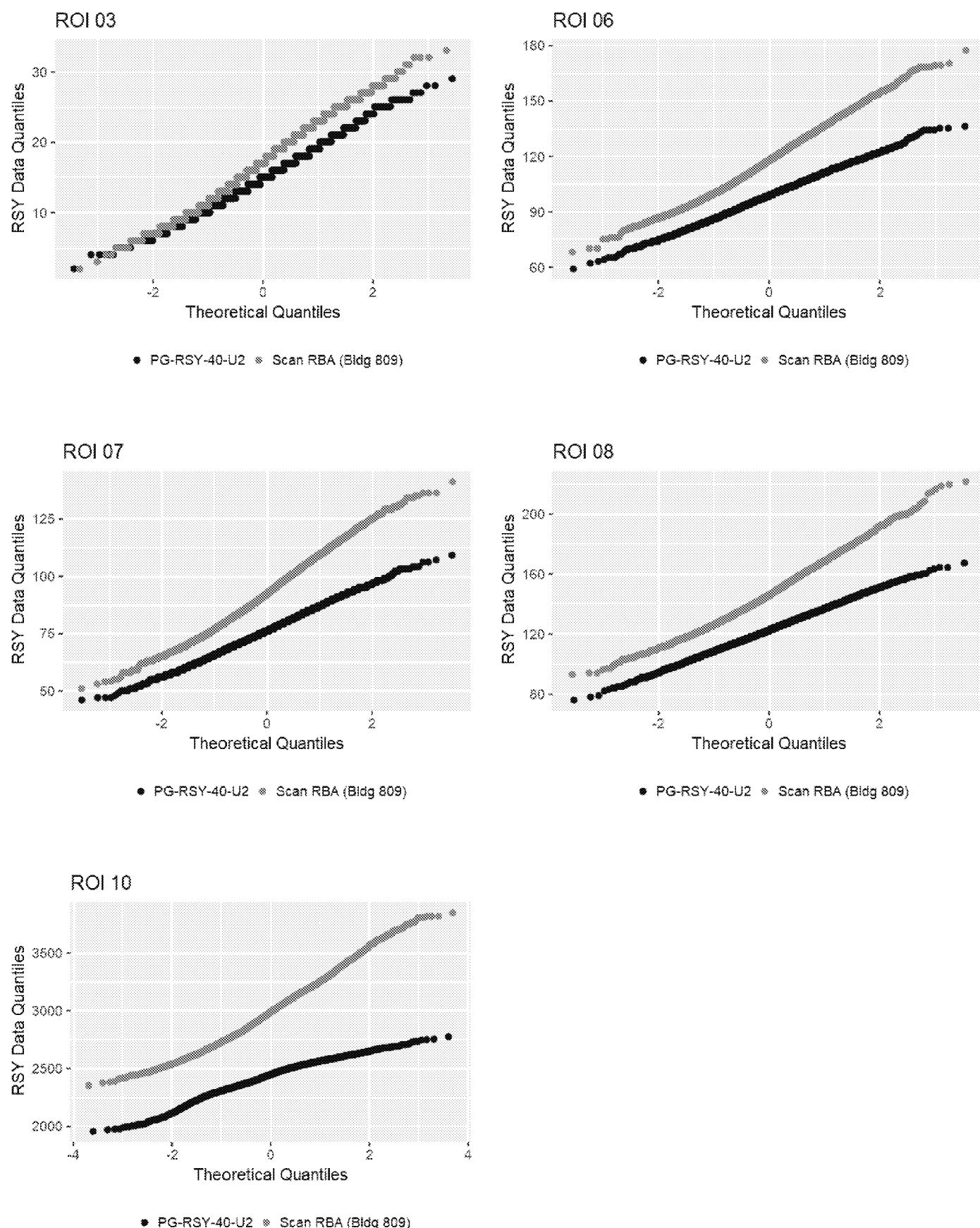
TYPE		Scan RBA (Bldg 809)				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-40-U2	1769
Scan RBA (Bldg 809)	4632

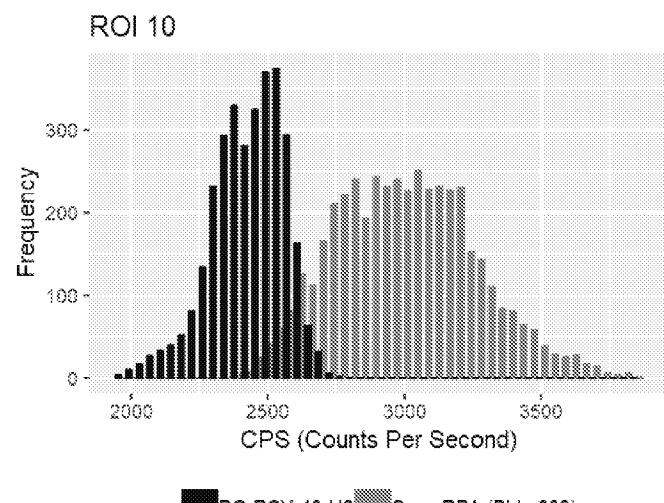
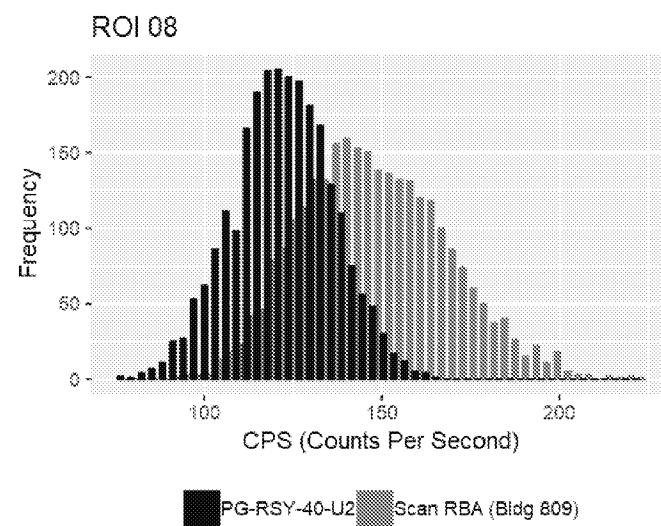
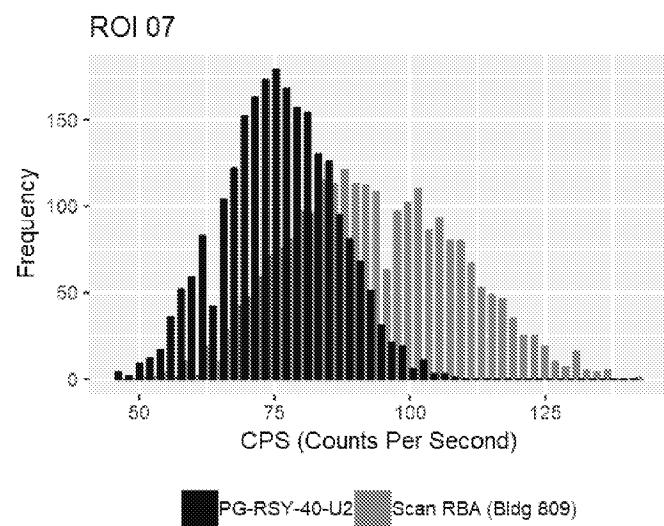
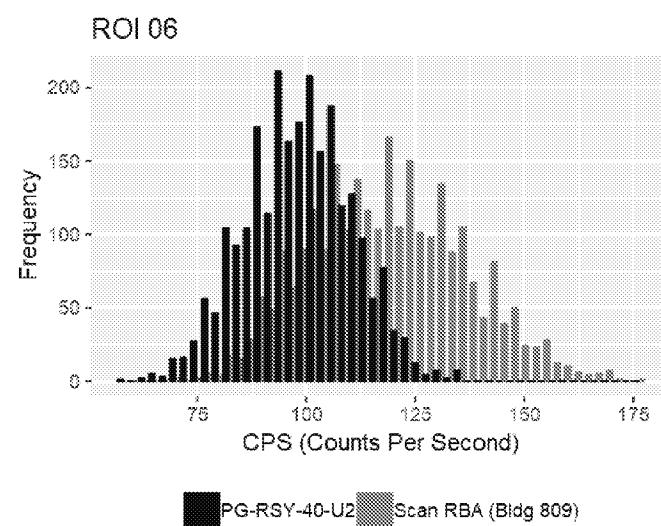
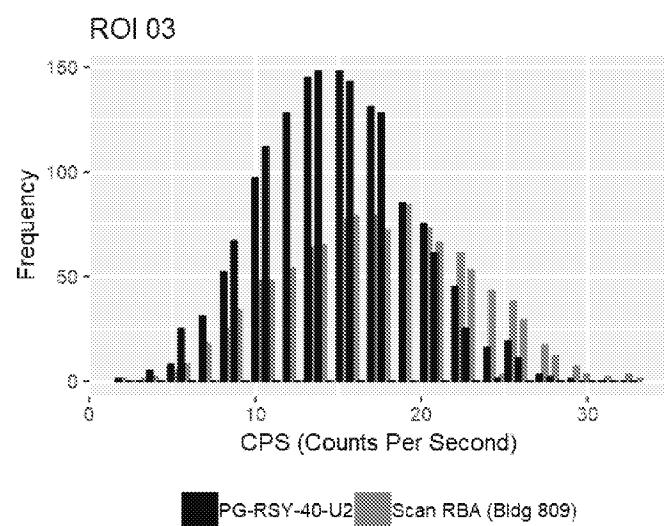
# Soil Scan Statistics

## Normal Q-Q Plots



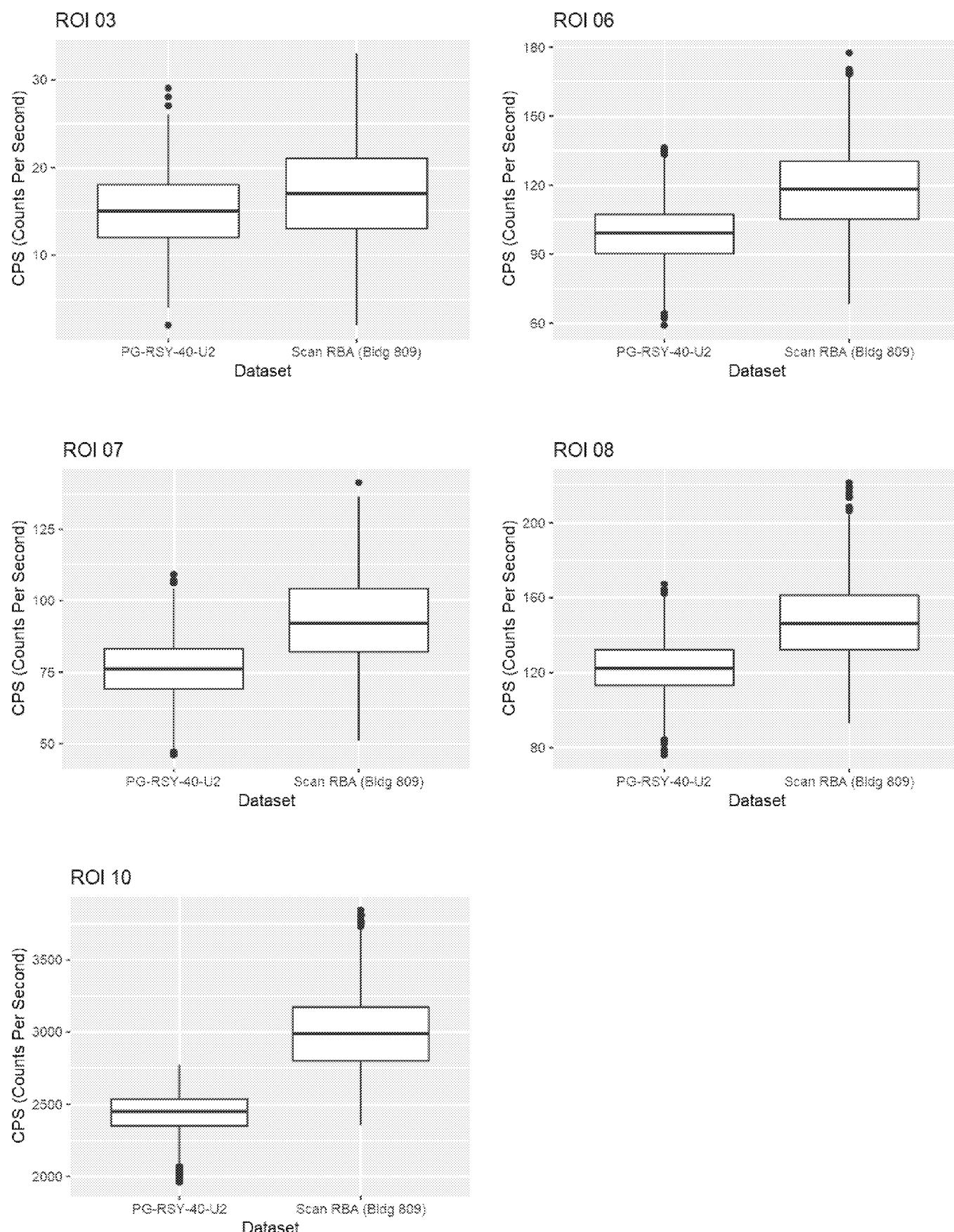
# Soil Scan Statistics

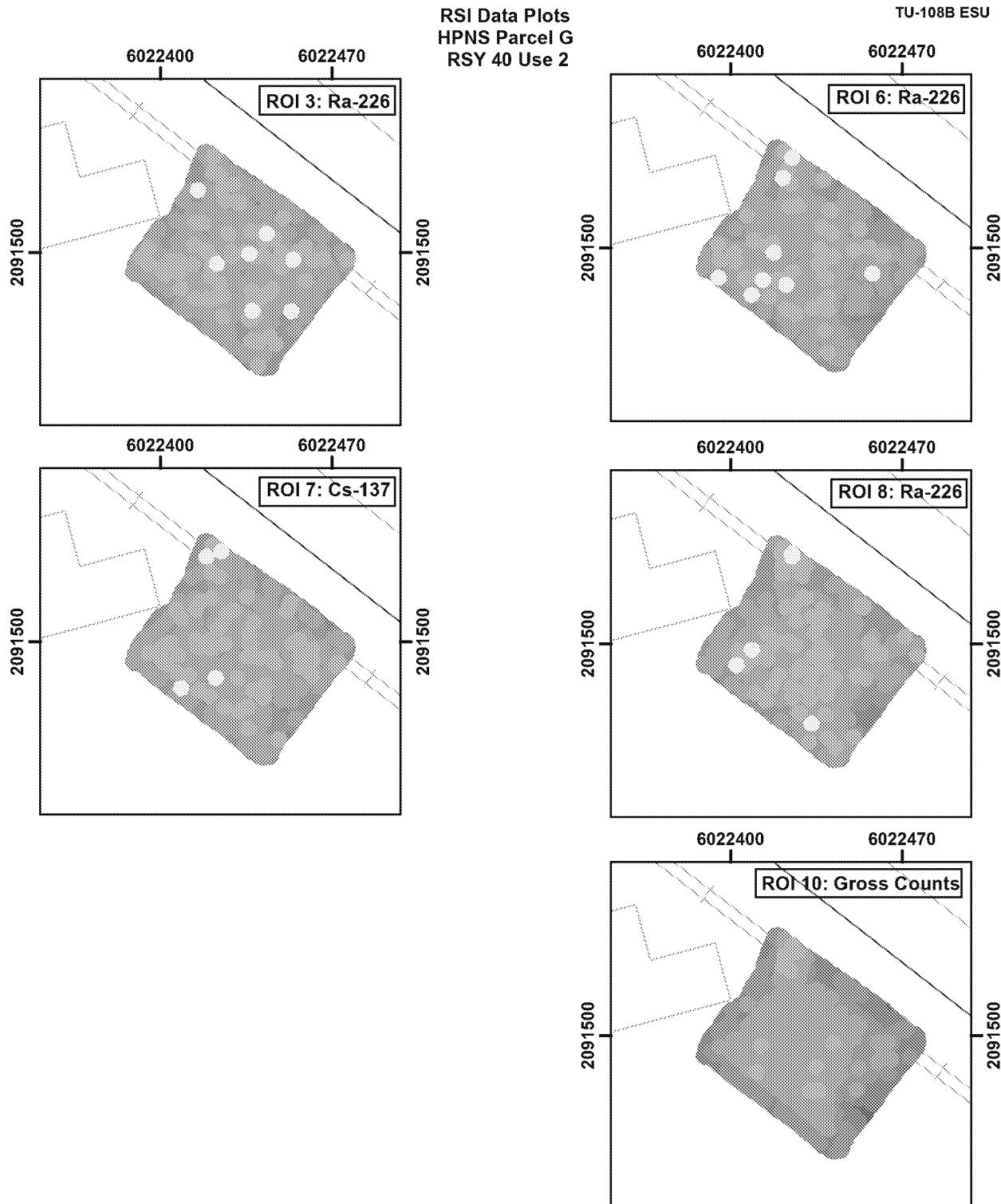
## Histograms



# Soil Scan Statistics

## Box Plots





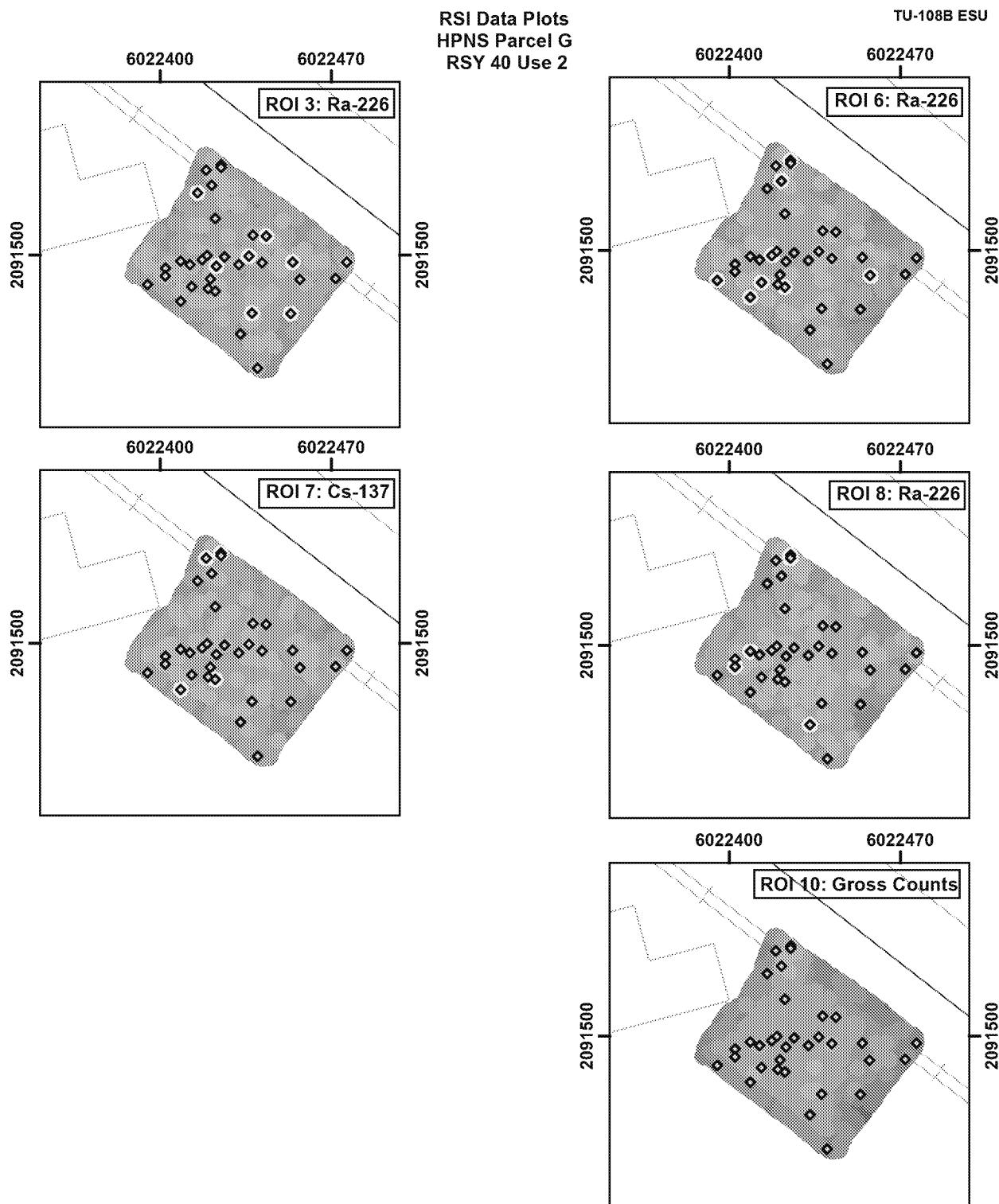
RS 700 Gamma Walkover Survey Data (VD1)

- > 3 std dev      ● > -1 to < 0 std dev
- > 2 to < 3 std dev      ● > -2 to < -1 std dev
- > 1 to < 2 std dev      ● > -3 to < -2 std dev
- > 0 to < 1 std dev      ● < -3 std dev

0      25      50      100  
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



**RS 700 Gamma Walkover Survey Data (VD1)**

- ◆ Follow-Up Locations
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

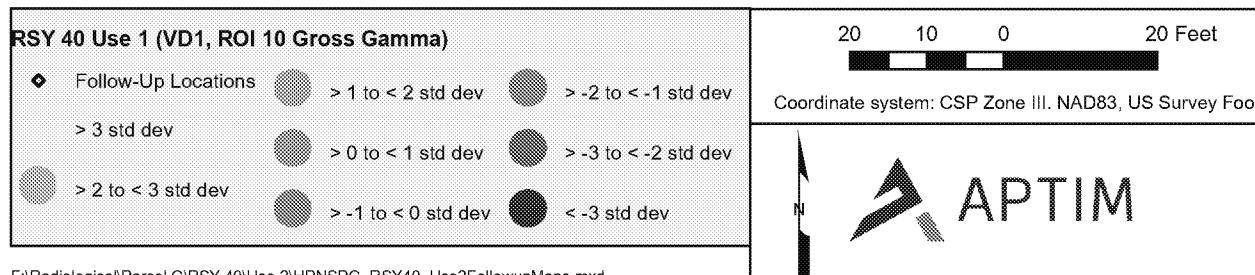
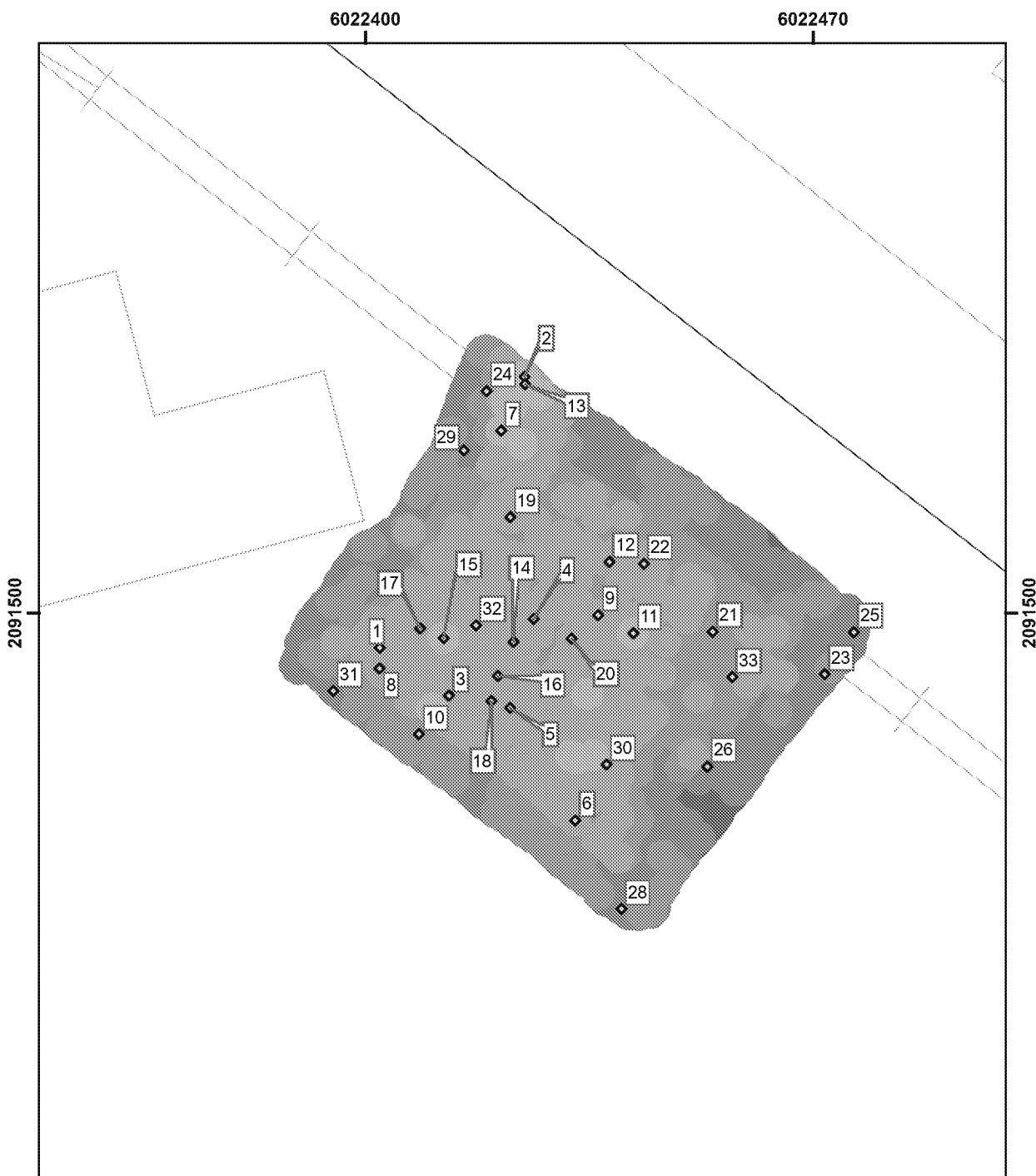
0      25      50      100  
Feet

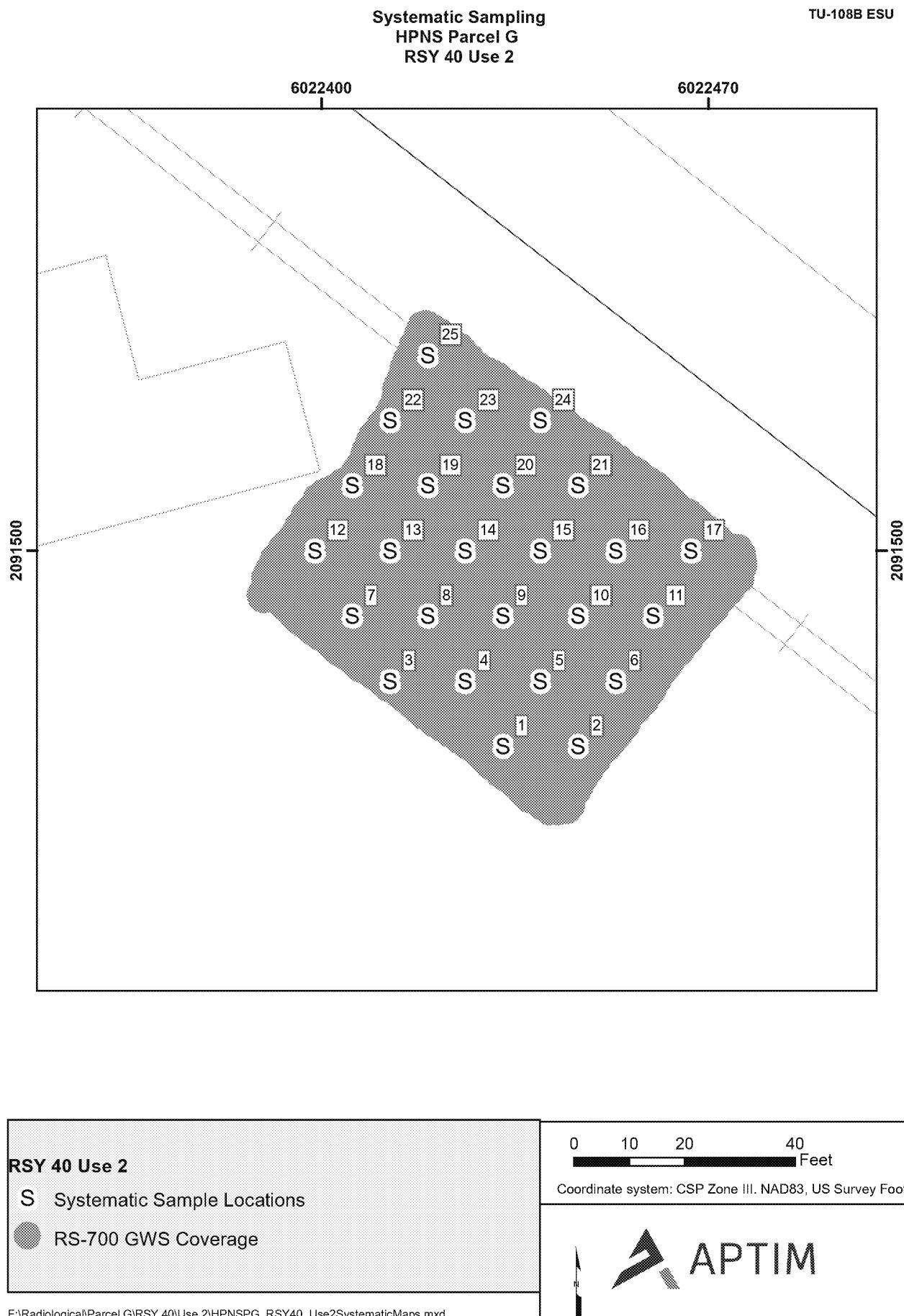
Coordinate system: CSP Zone III, NAD83, US Survey Foot



**Follow-Up Static Survey  
HPNS Parcel G  
RSY 40 Use 2**

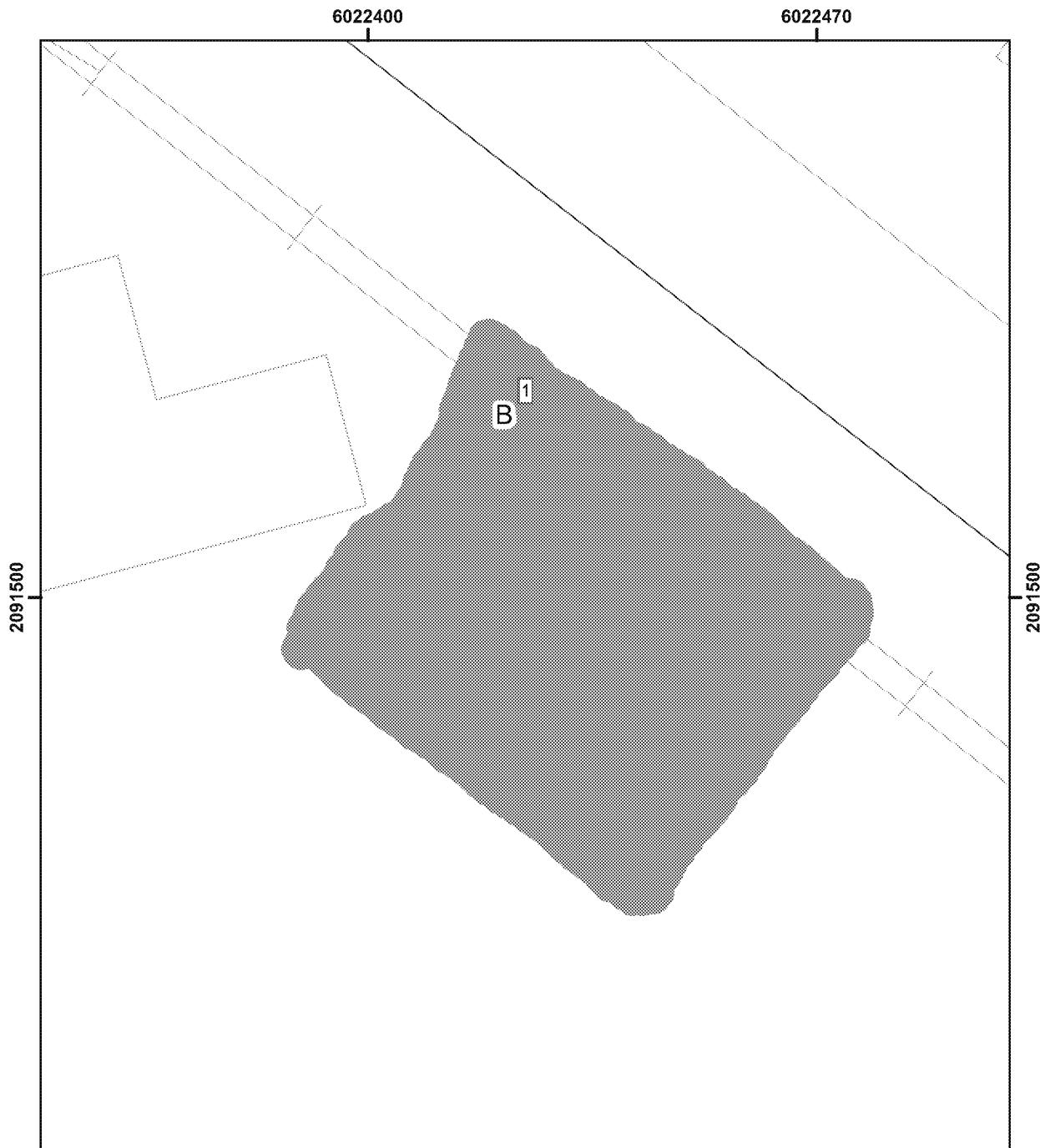
TU-108B ESU





Biased Sampling  
HPNS Parcel G  
RSY 40 Use 2

TU-108B ESU



**RSY 40 Use 2**

B Biased Sample Location

● RS-700 GWS Coverage

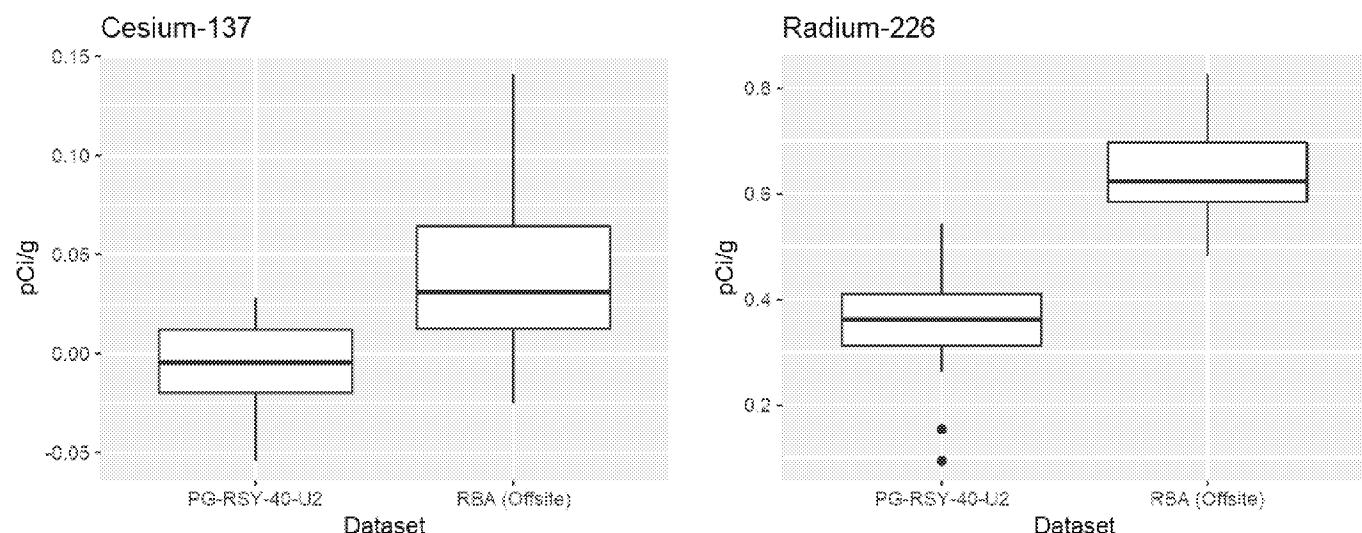
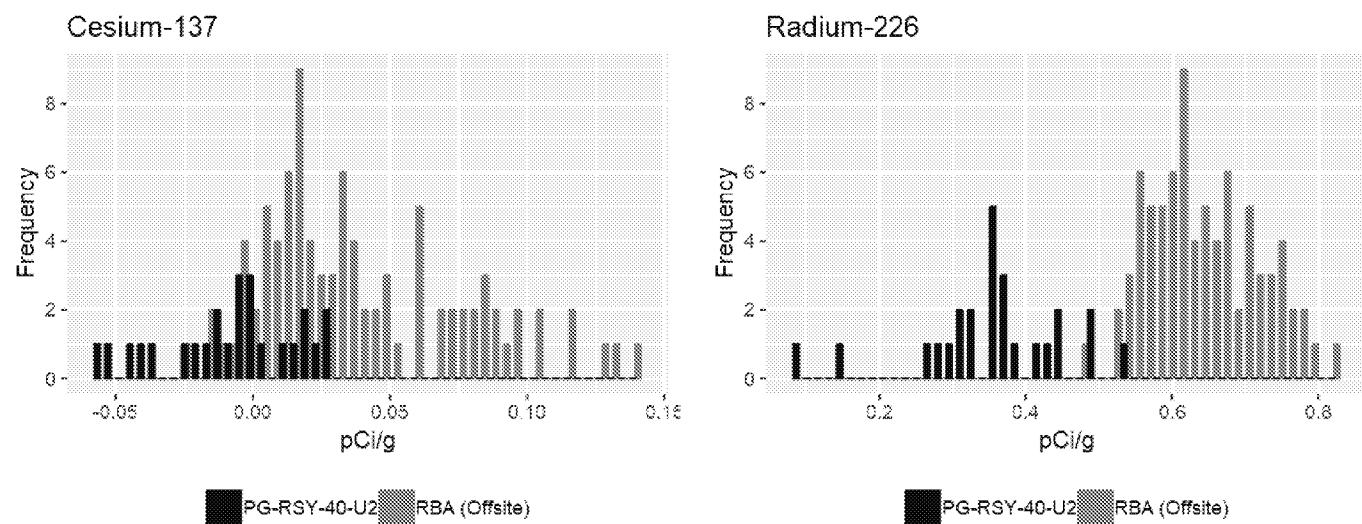
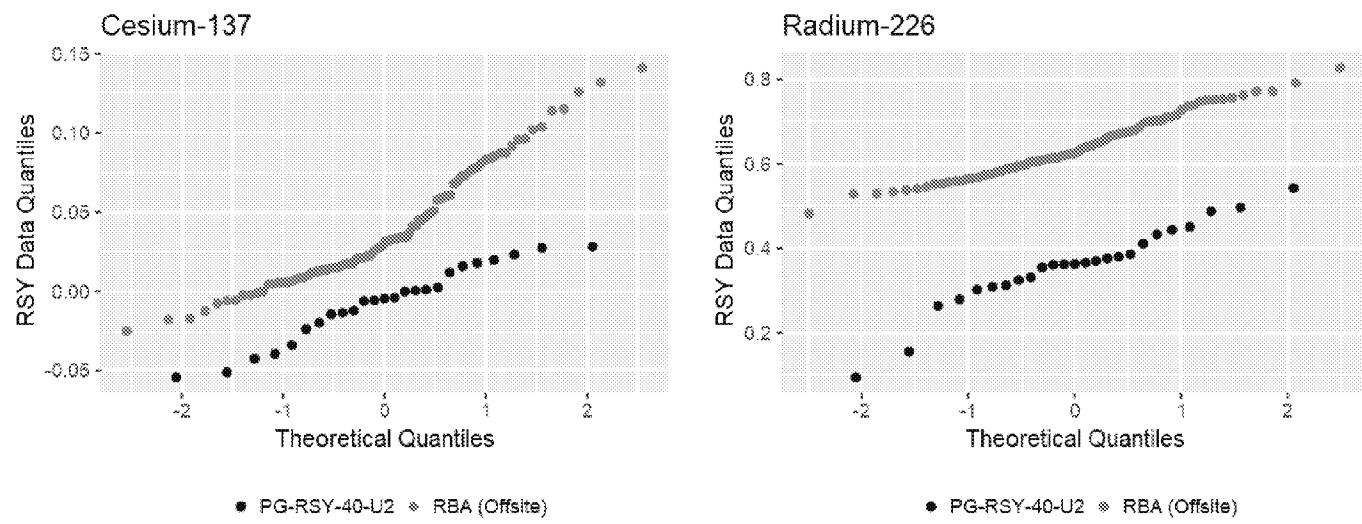
20 10 0 20 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



**APTIM**

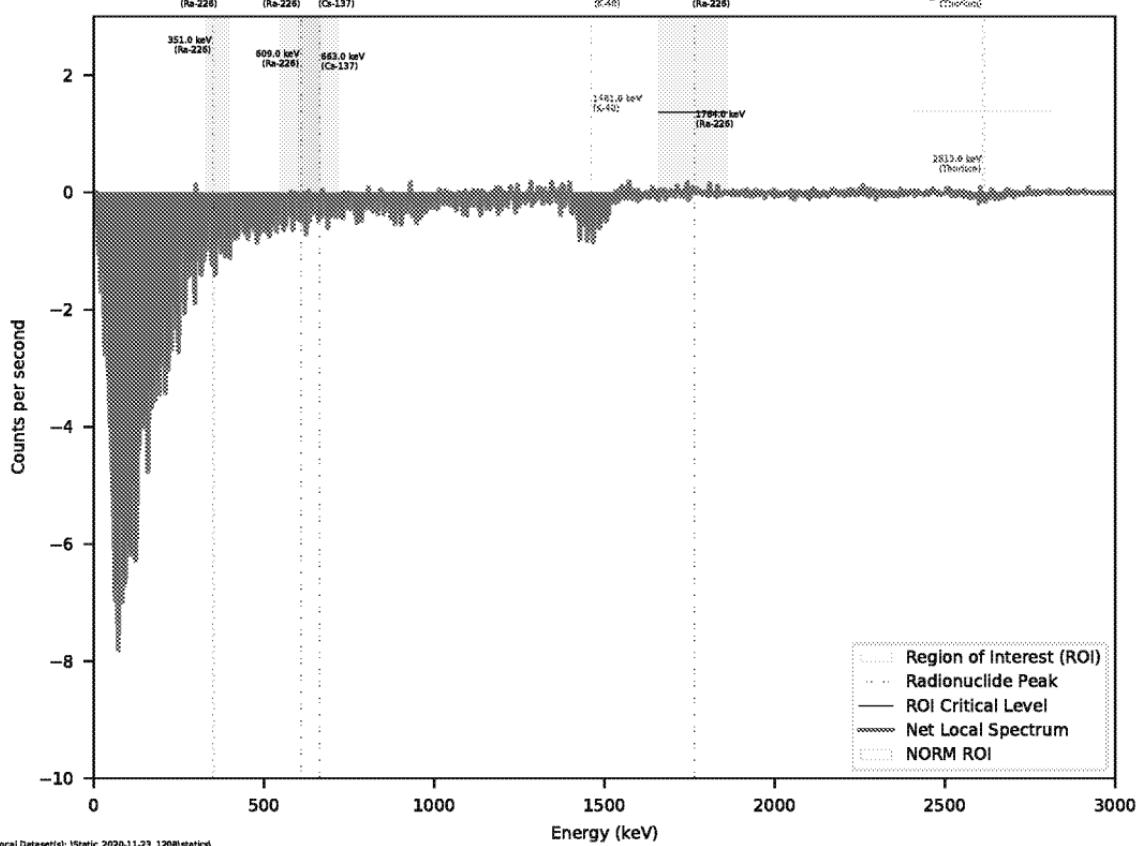
## Soil Sample Statistics





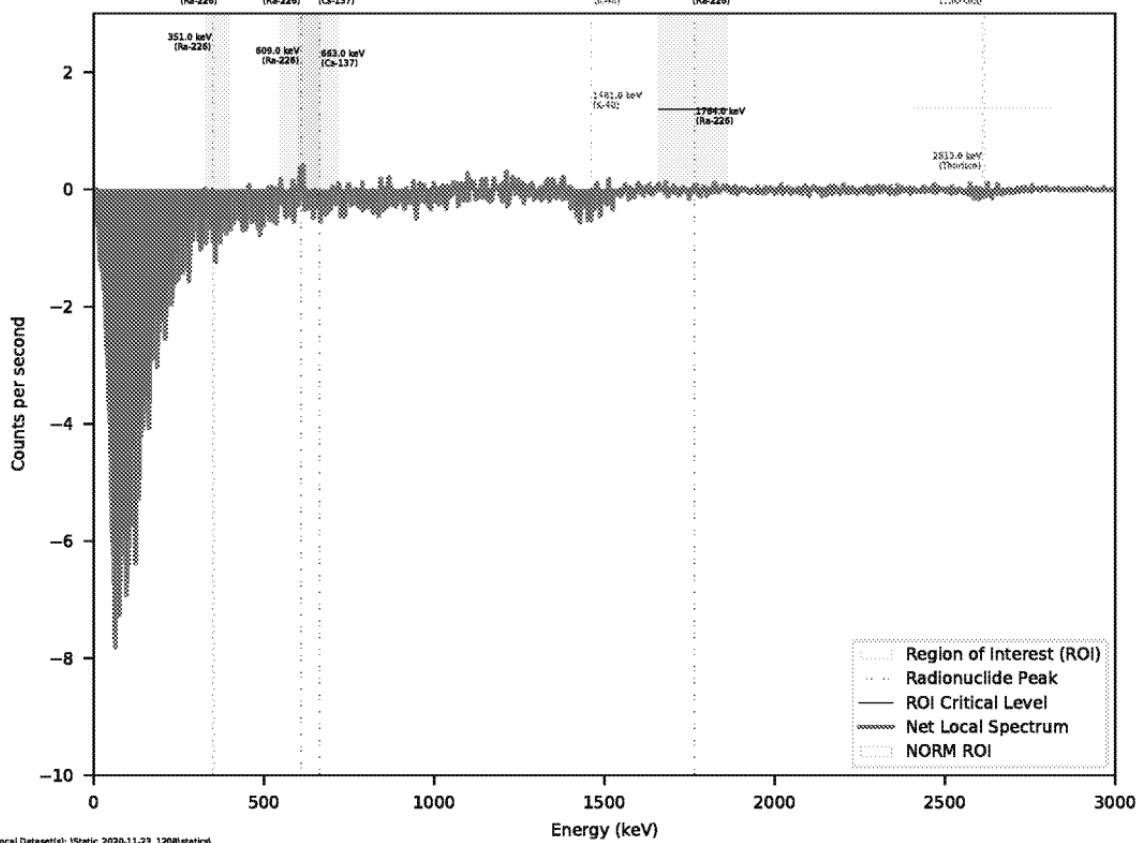
## Net Gamma Spectrum, Static Location: 1

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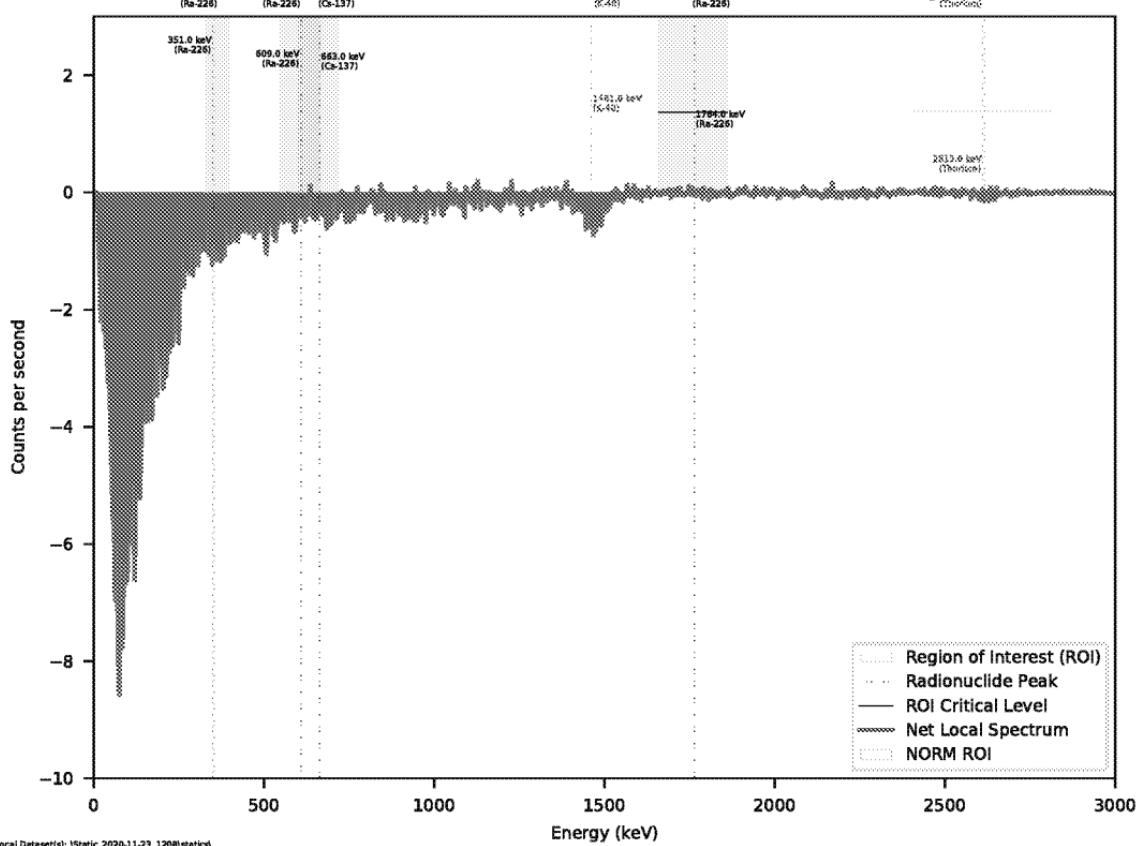
## Net Gamma Spectrum, Static Location: 2

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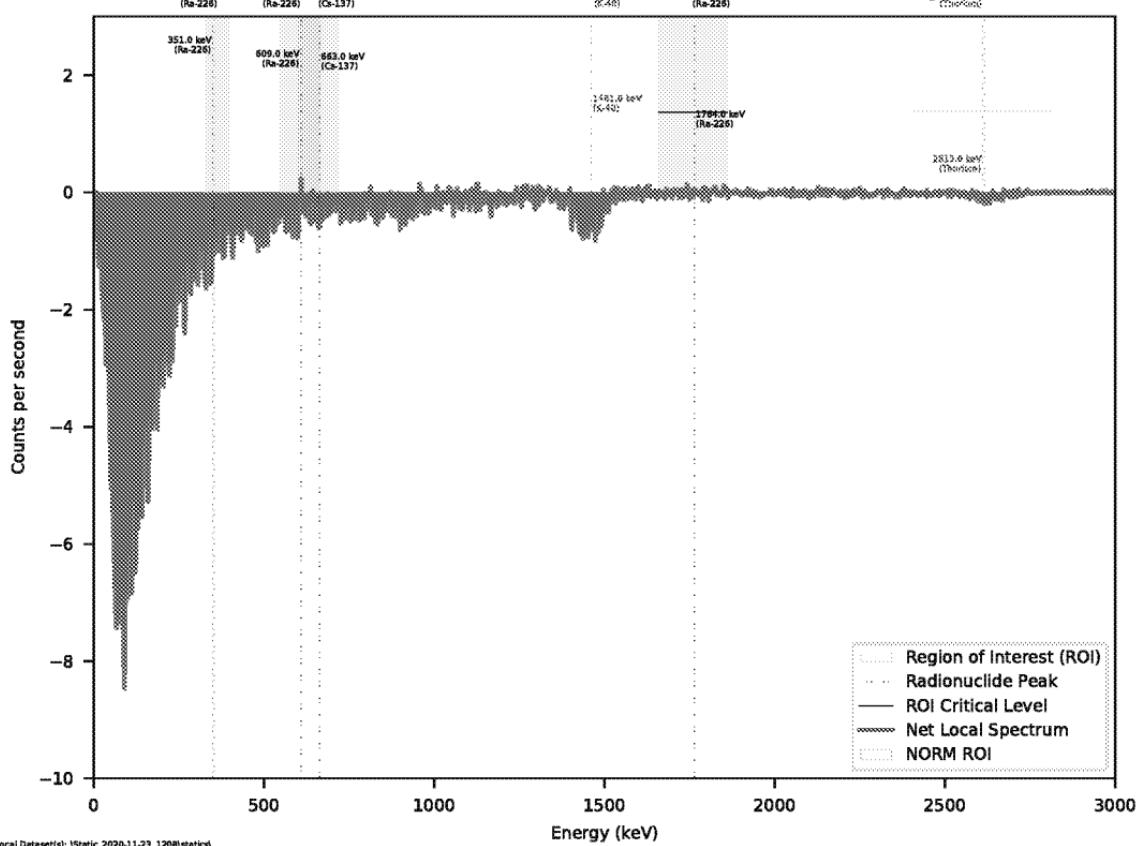
## Net Gamma Spectrum, Static Location: 3

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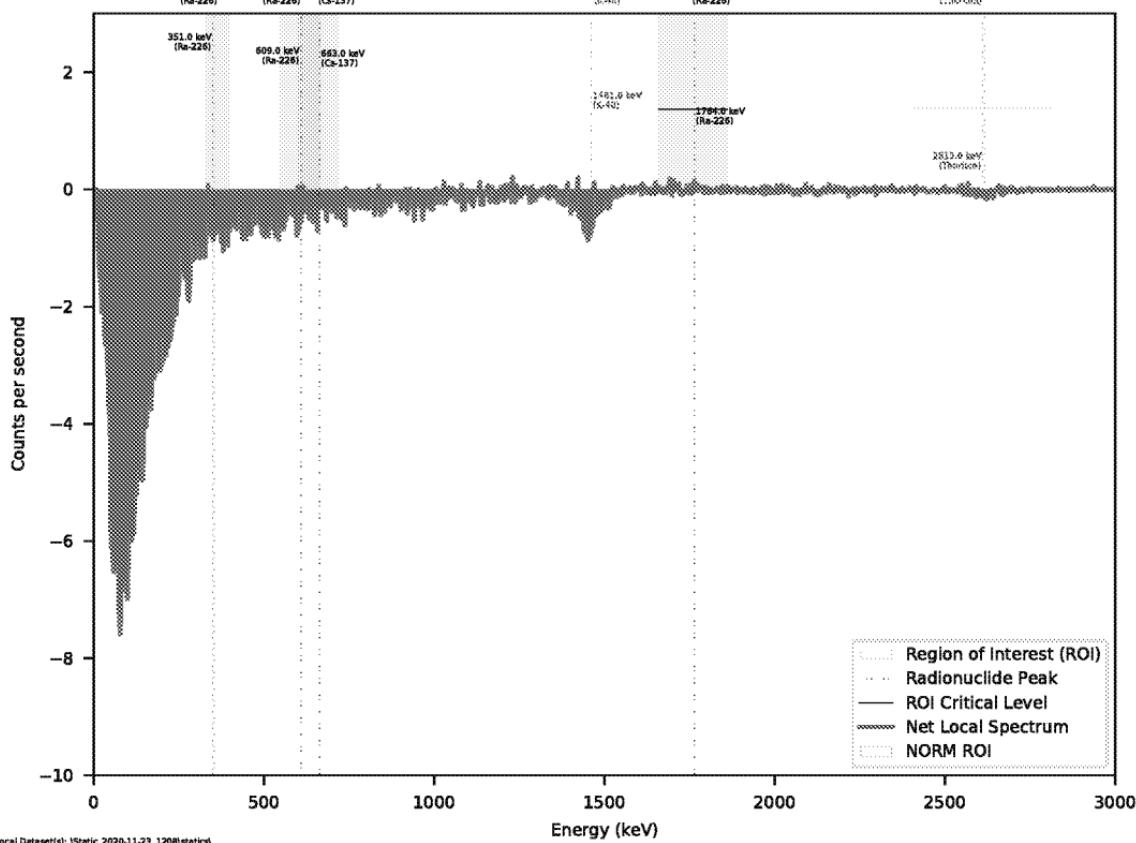
## Net Gamma Spectrum, Static Location: 4

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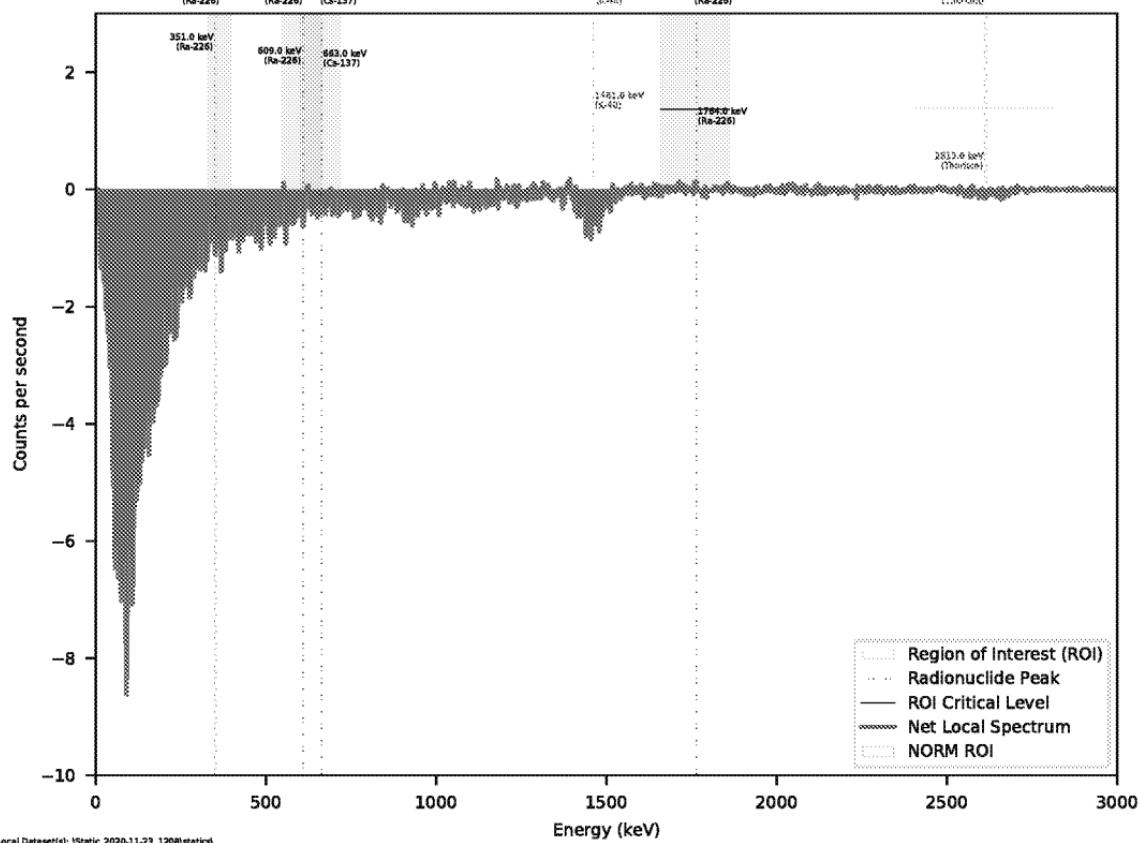
## Net Gamma Spectrum, Static Location: 5

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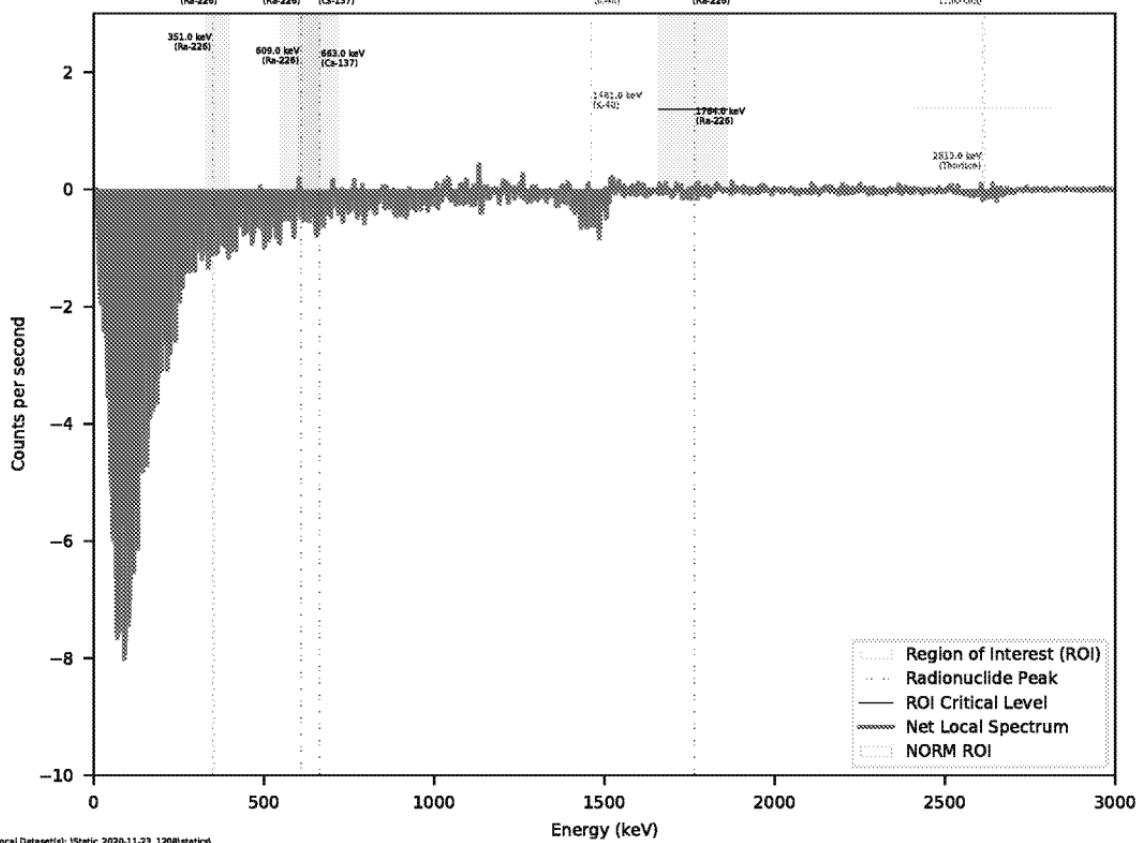
## Net Gamma Spectrum, Static Location: 6

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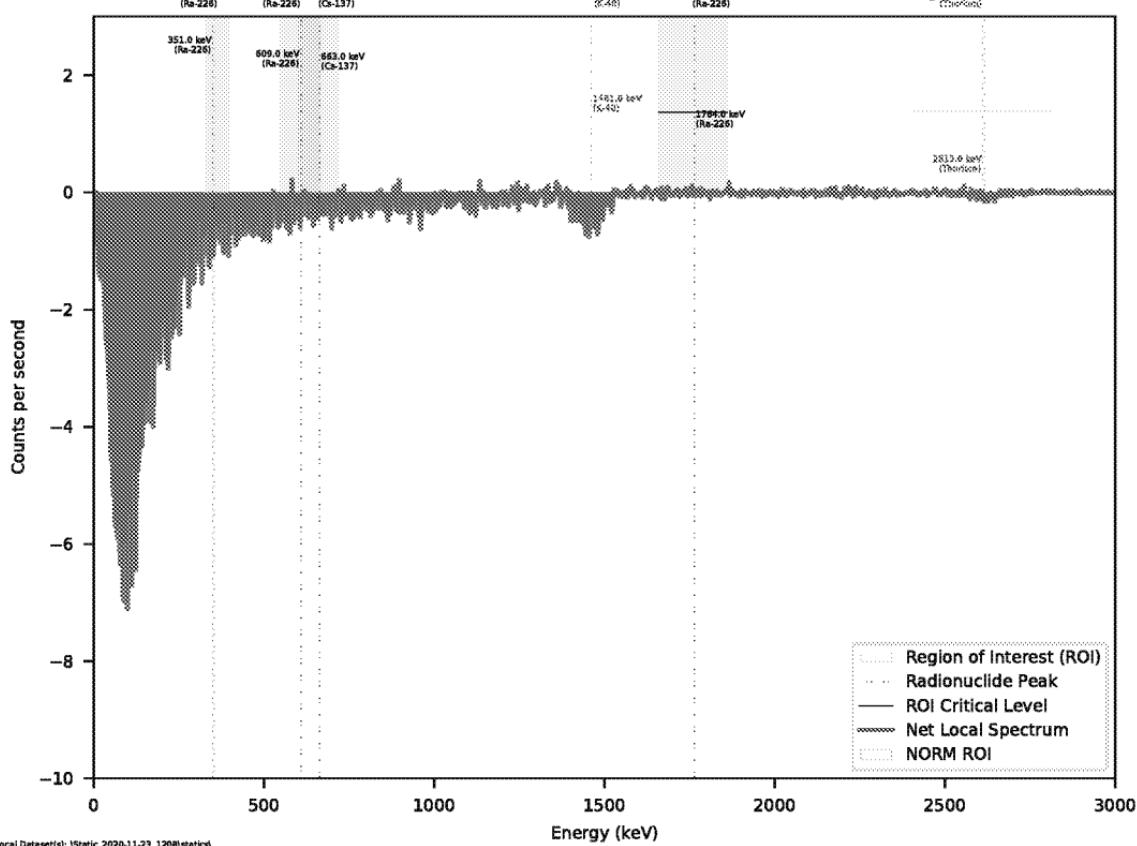
## Net Gamma Spectrum, Static Location: 7

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## Net Gamma Spectrum, Static Location: 8

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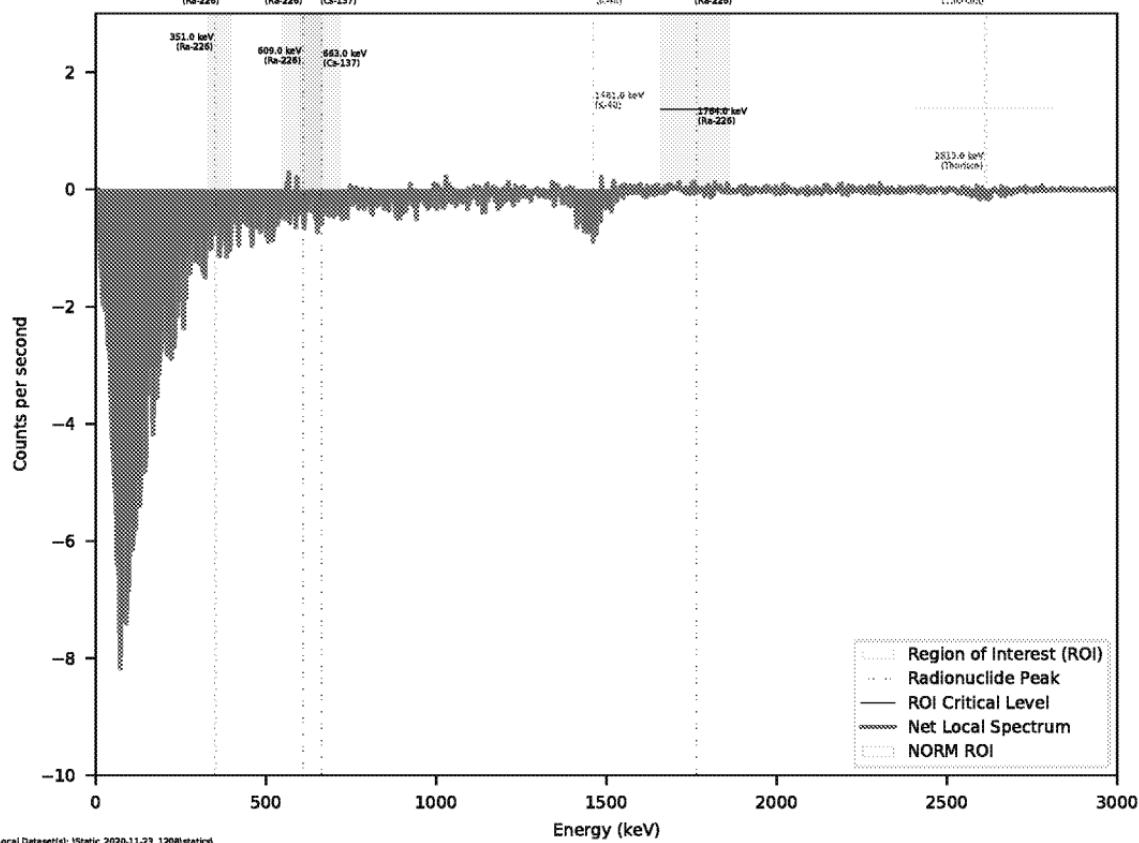
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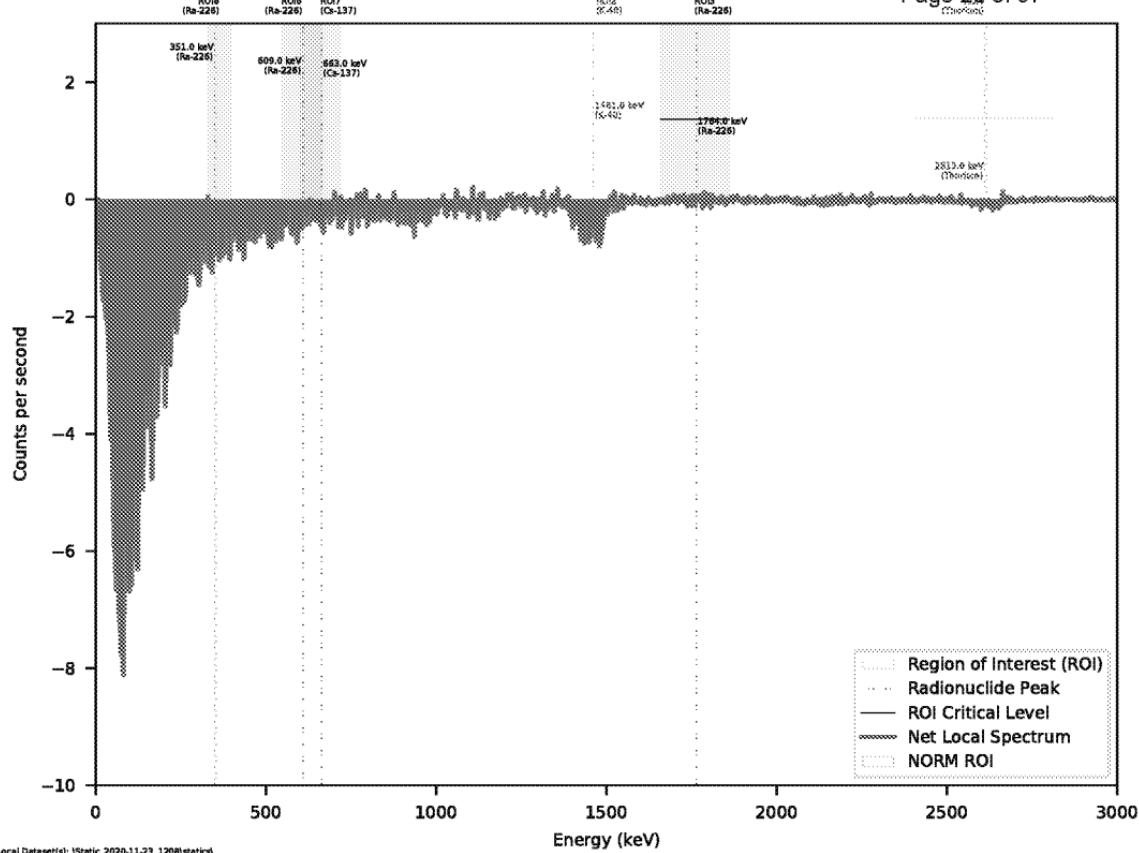
## Net Gamma Spectrum, Static Location: 9

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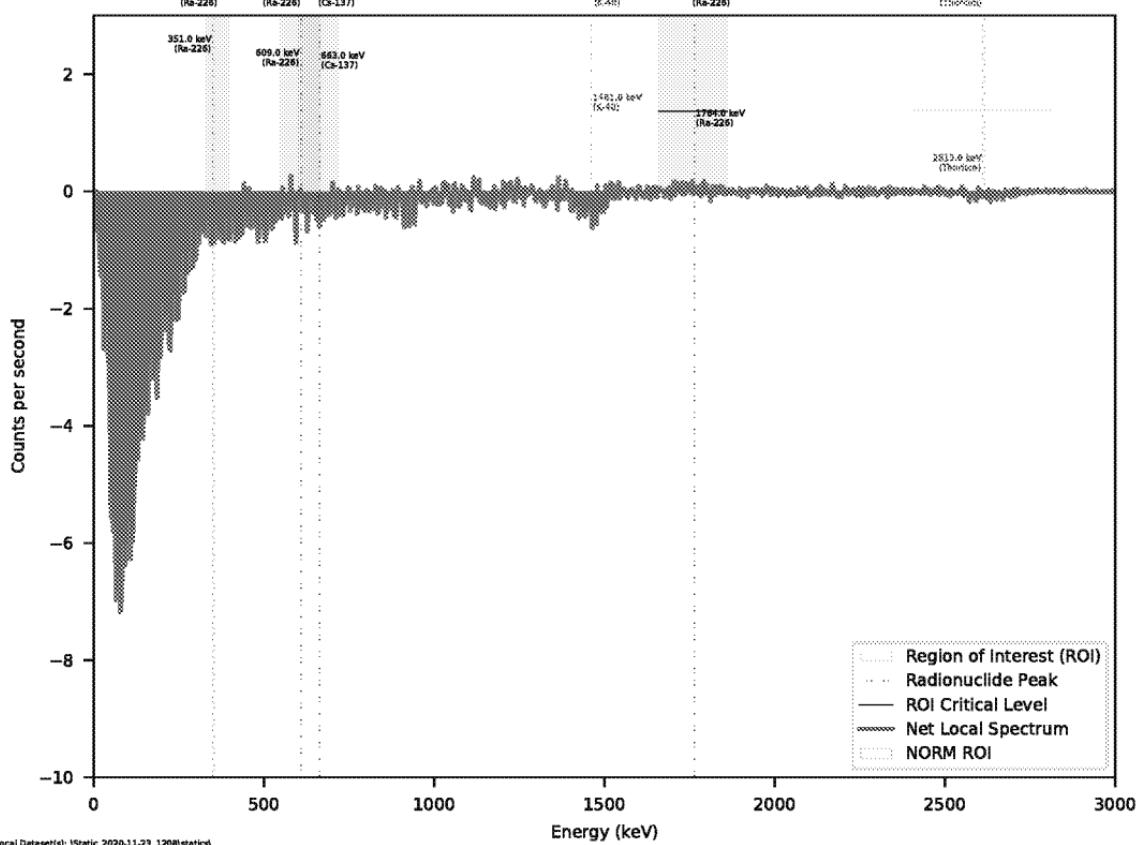
## Net Gamma Spectrum, Static Location: 10

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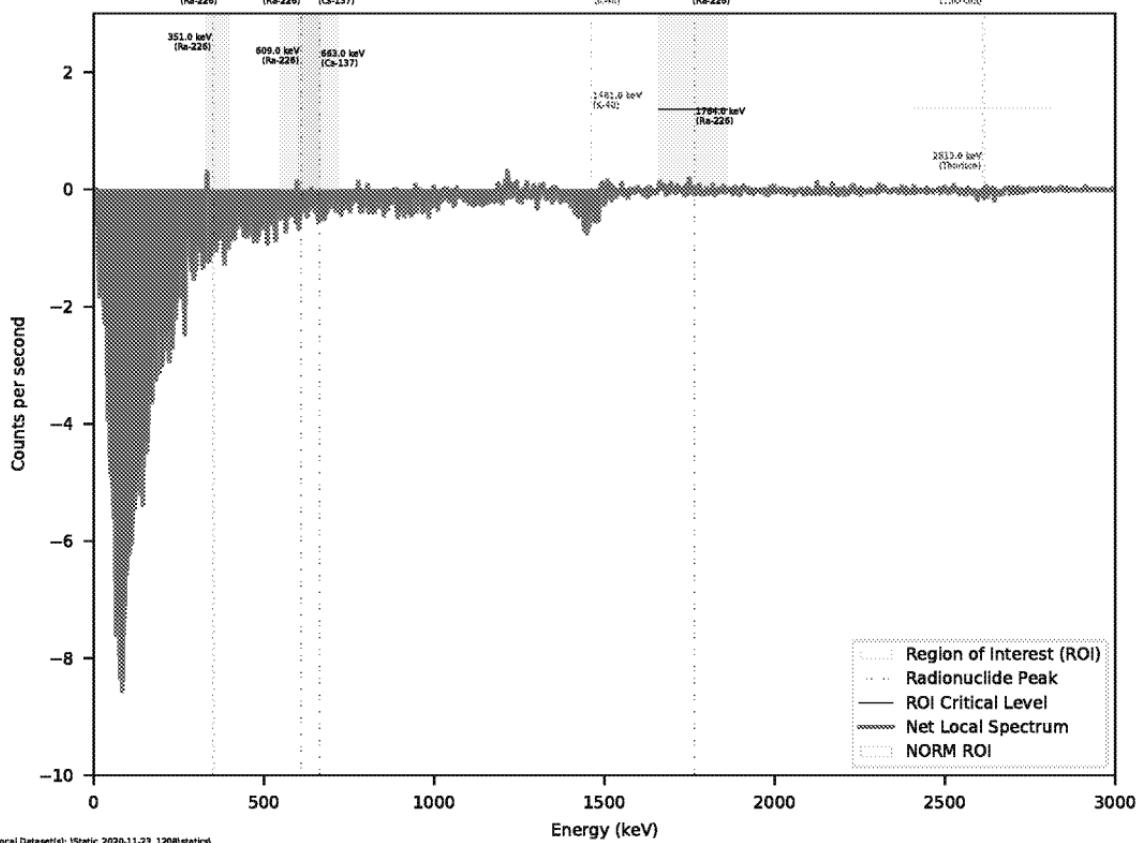
## Net Gamma Spectrum, Static Location: 11

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## Net Gamma Spectrum, Static Location: 12

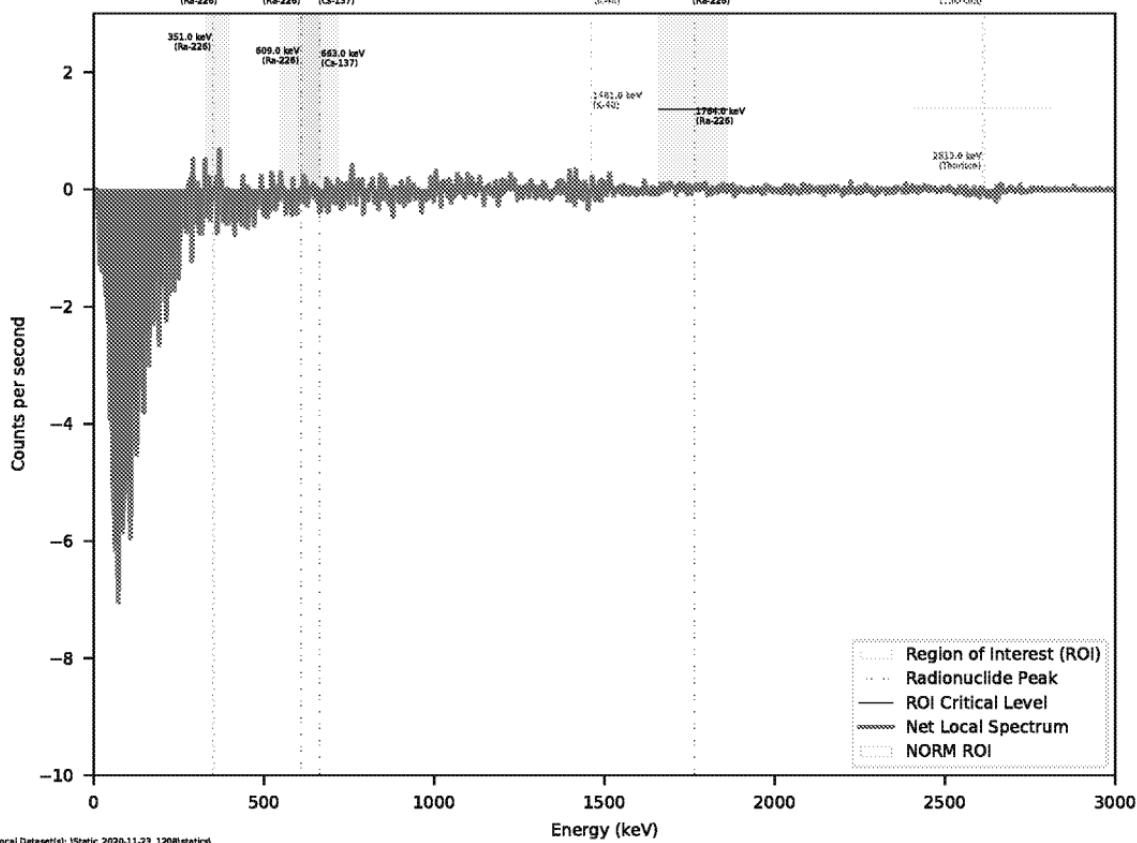
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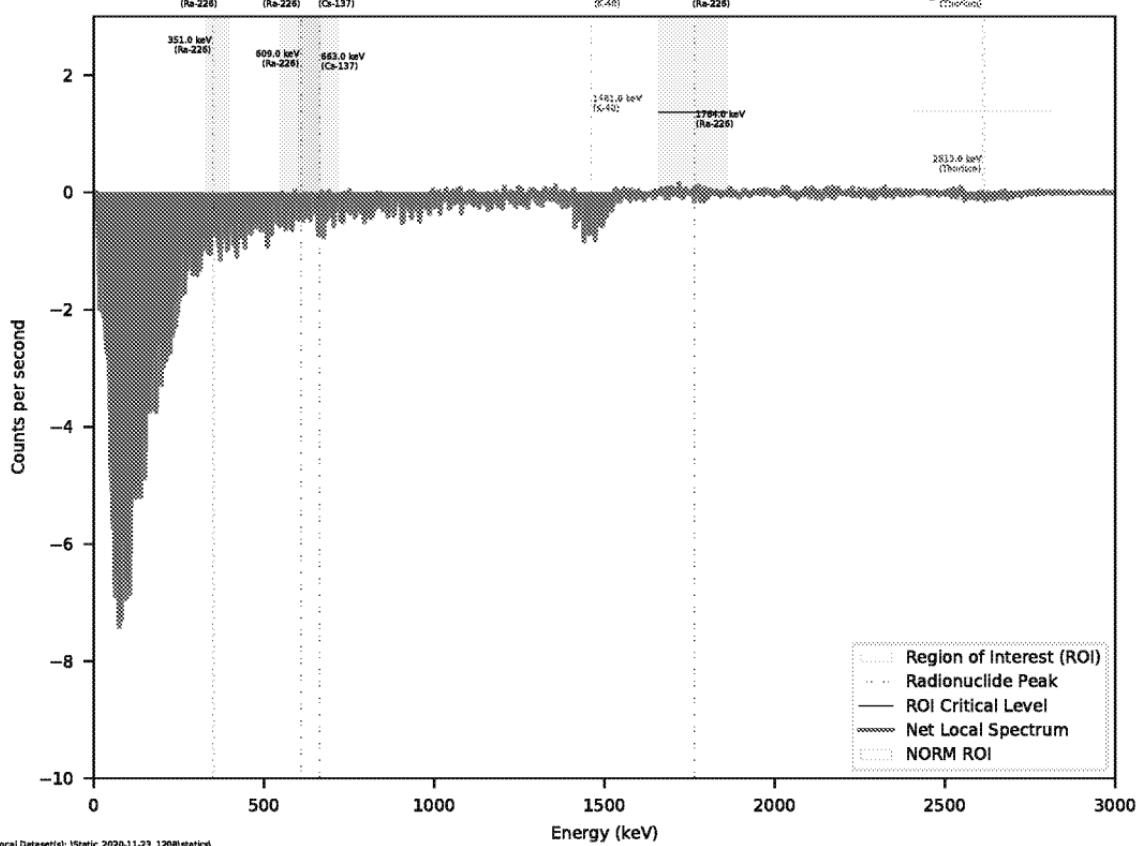
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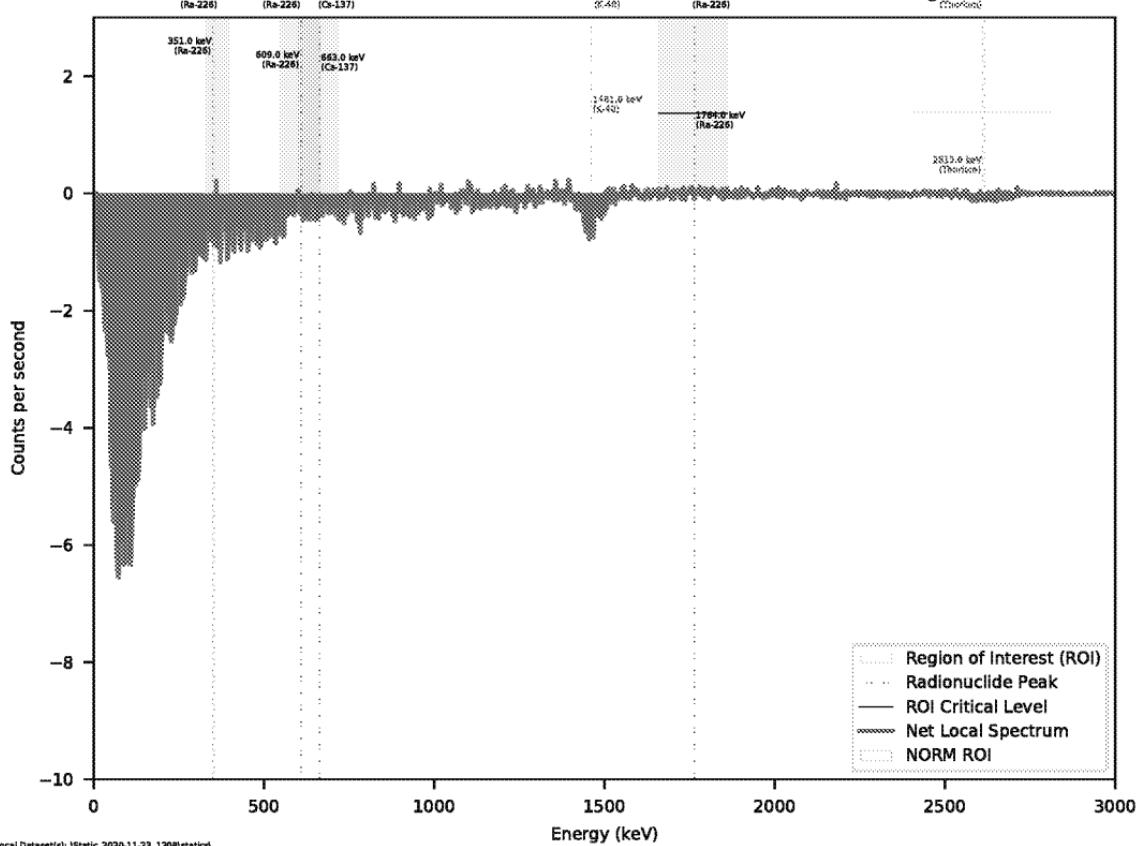
## Net Gamma Spectrum, Static Location: 14

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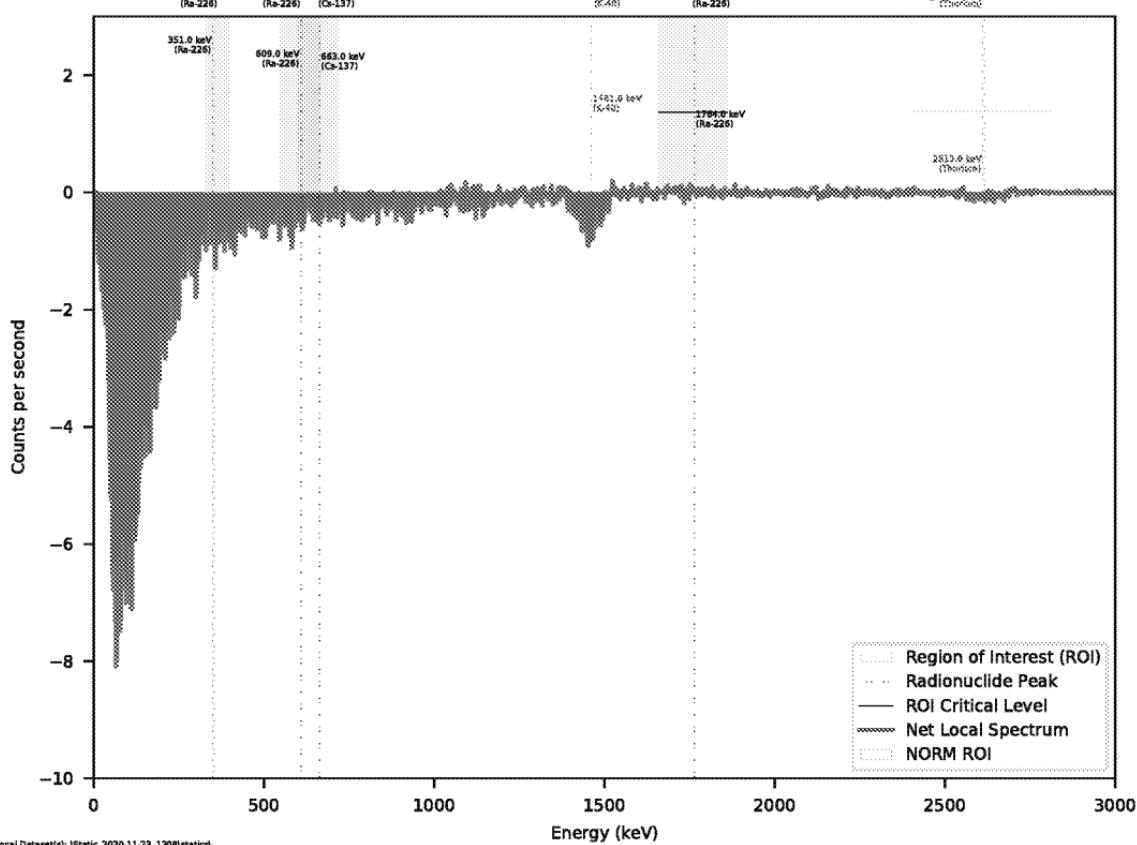
## Net Gamma Spectrum, Static Location: 15

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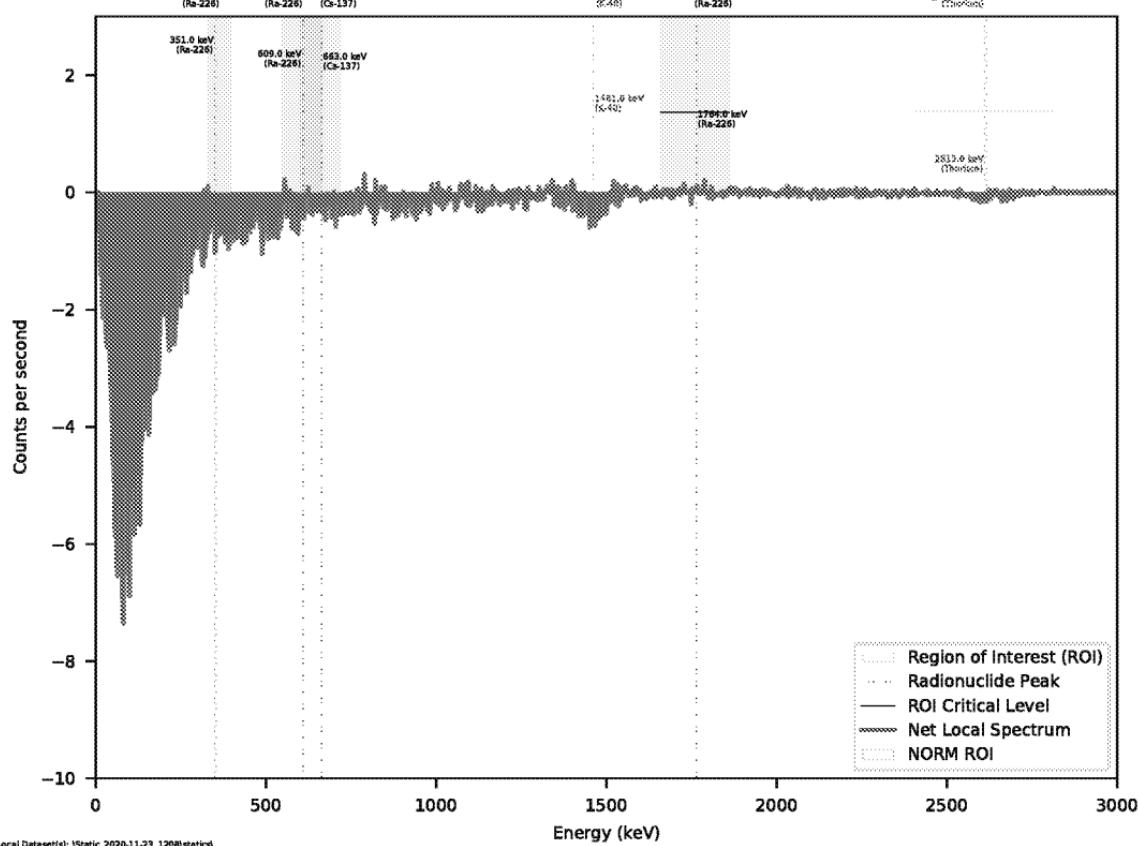
## Net Gamma Spectrum, Static Location: 16

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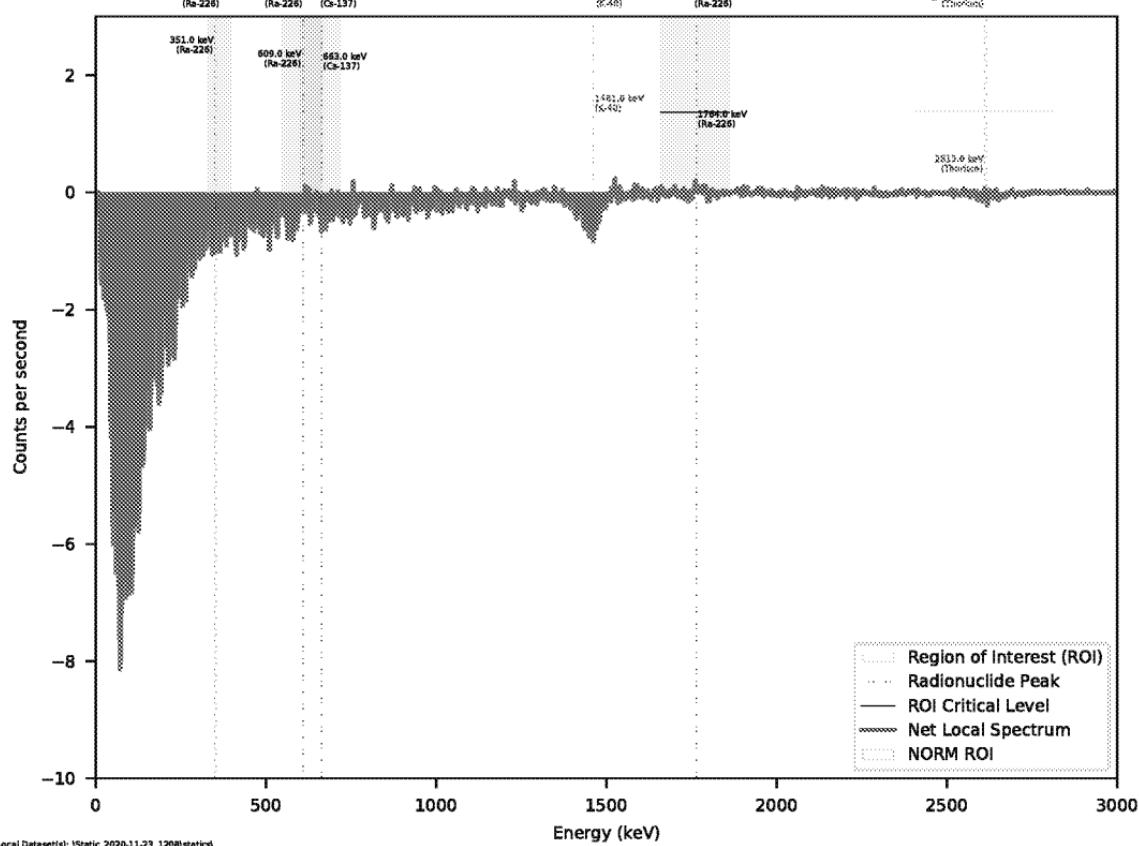
## Net Gamma Spectrum, Static Location: 17

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## Net Gamma Spectrum, Static Location: 18

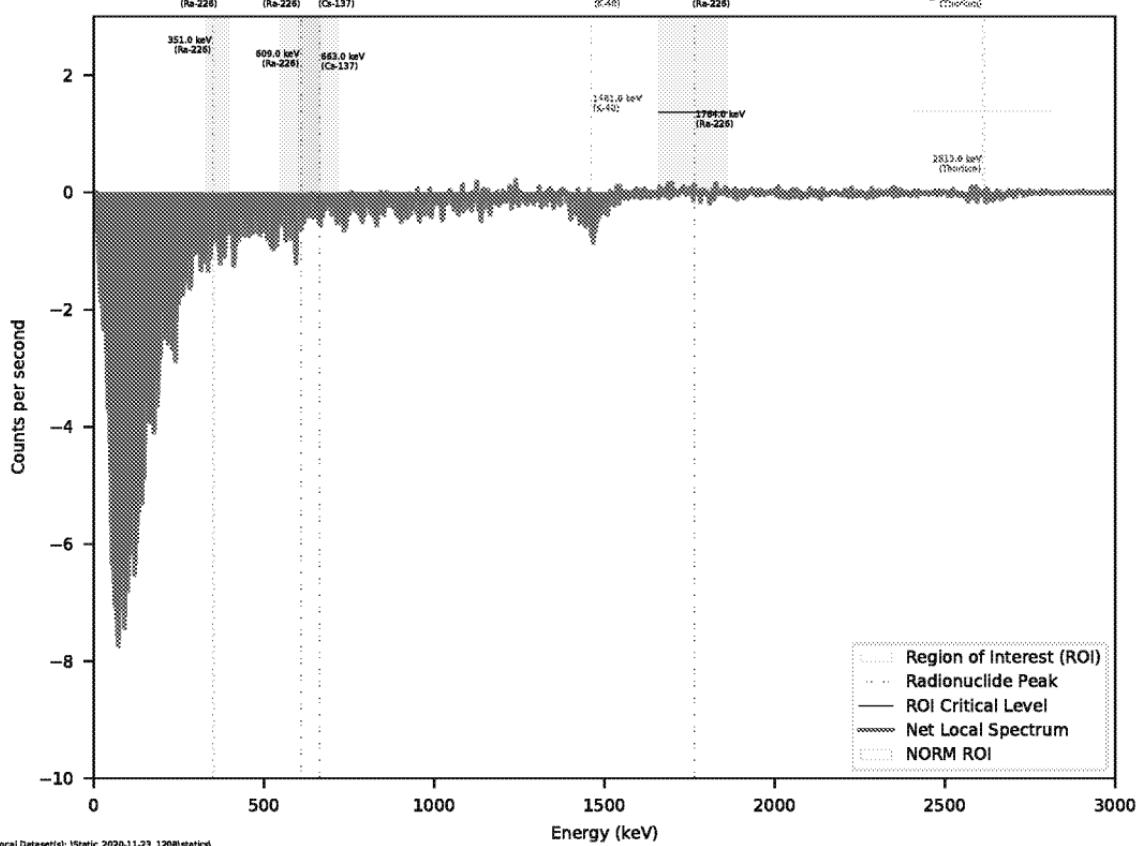
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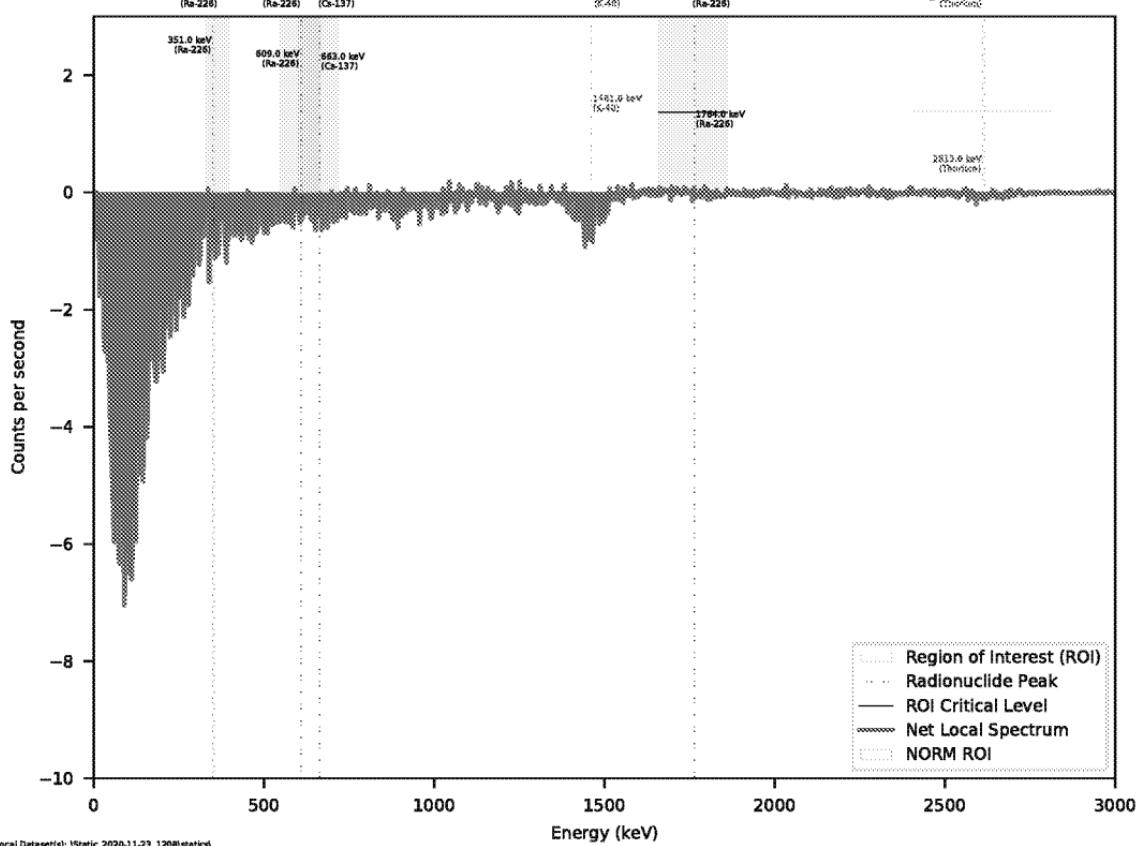
## Net Gamma Spectrum, Static Location: 19

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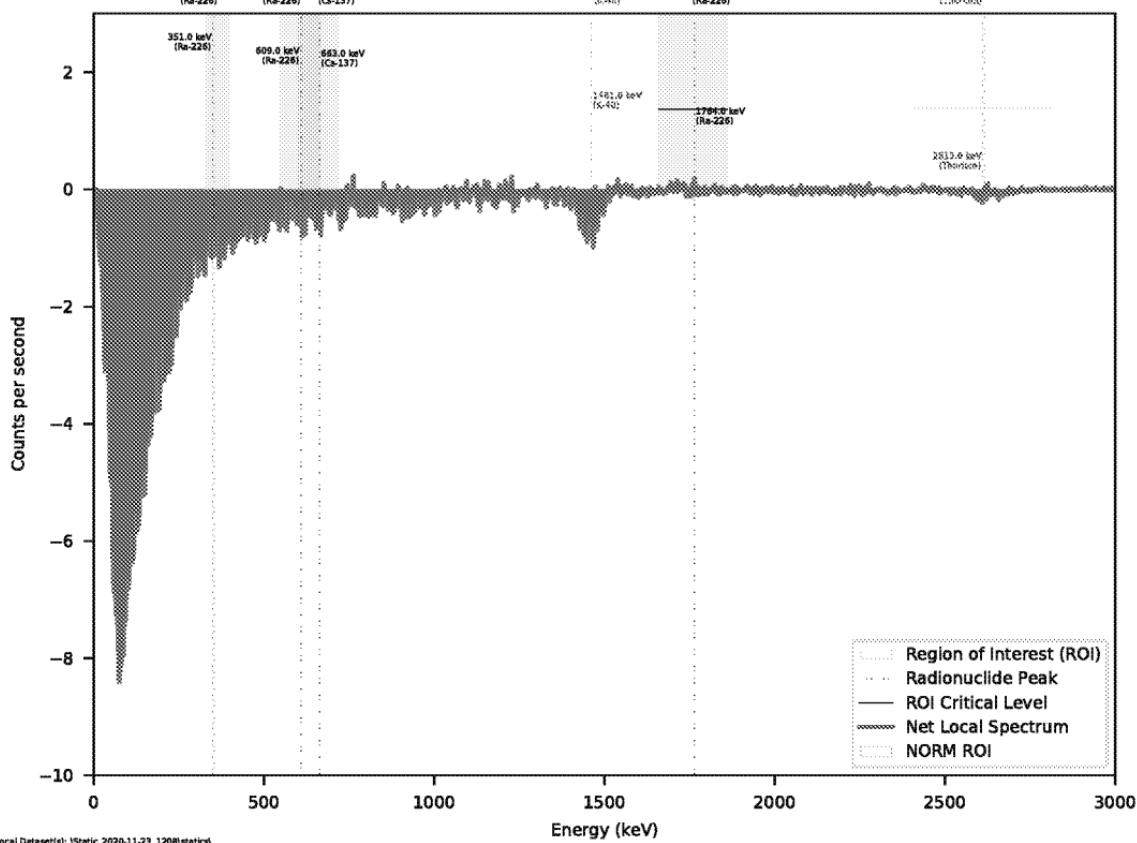
## Net Gamma Spectrum, Static Location: 20

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## Net Gamma Spectrum, Static Location: 21

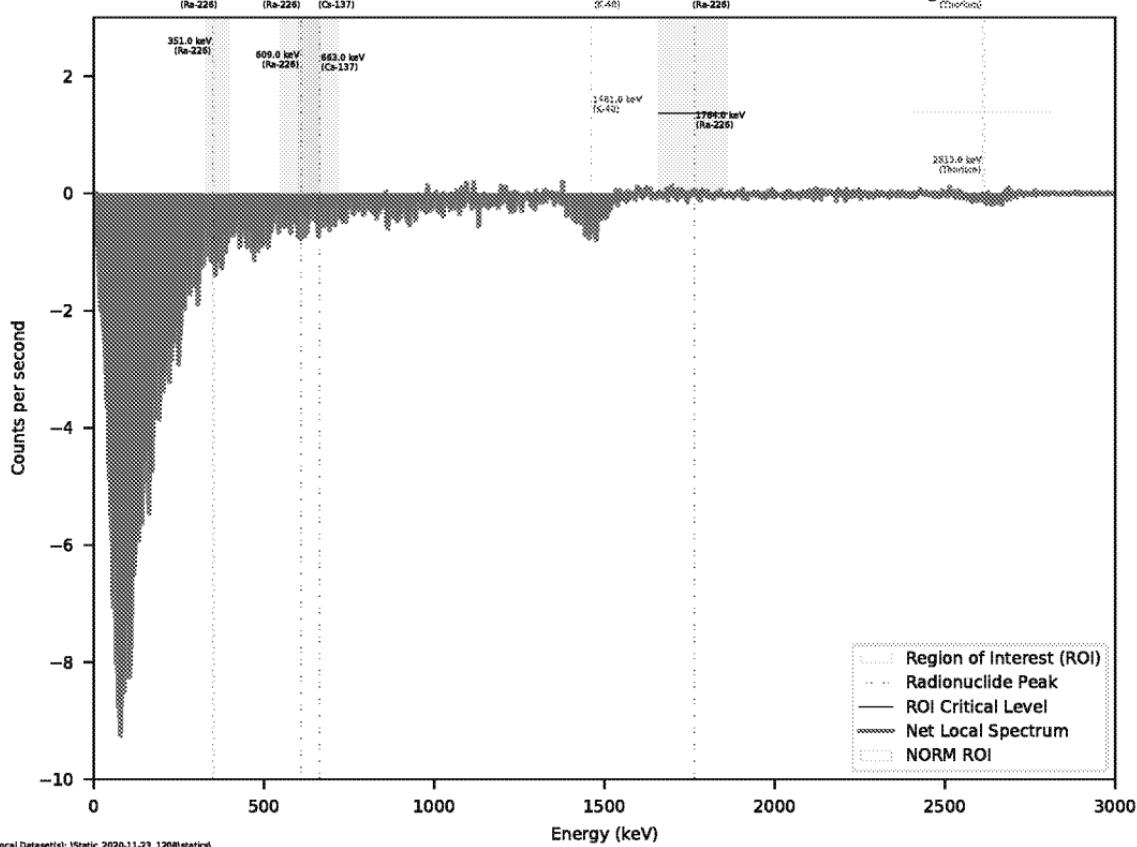
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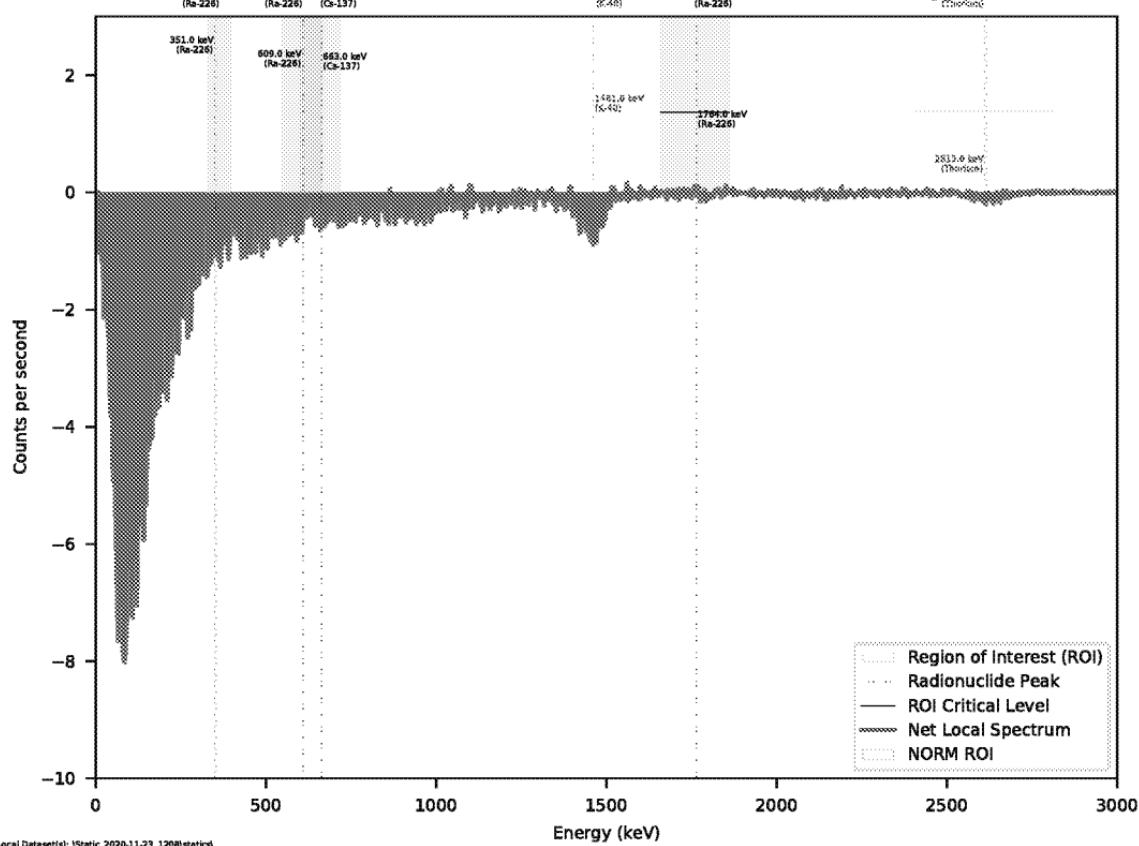
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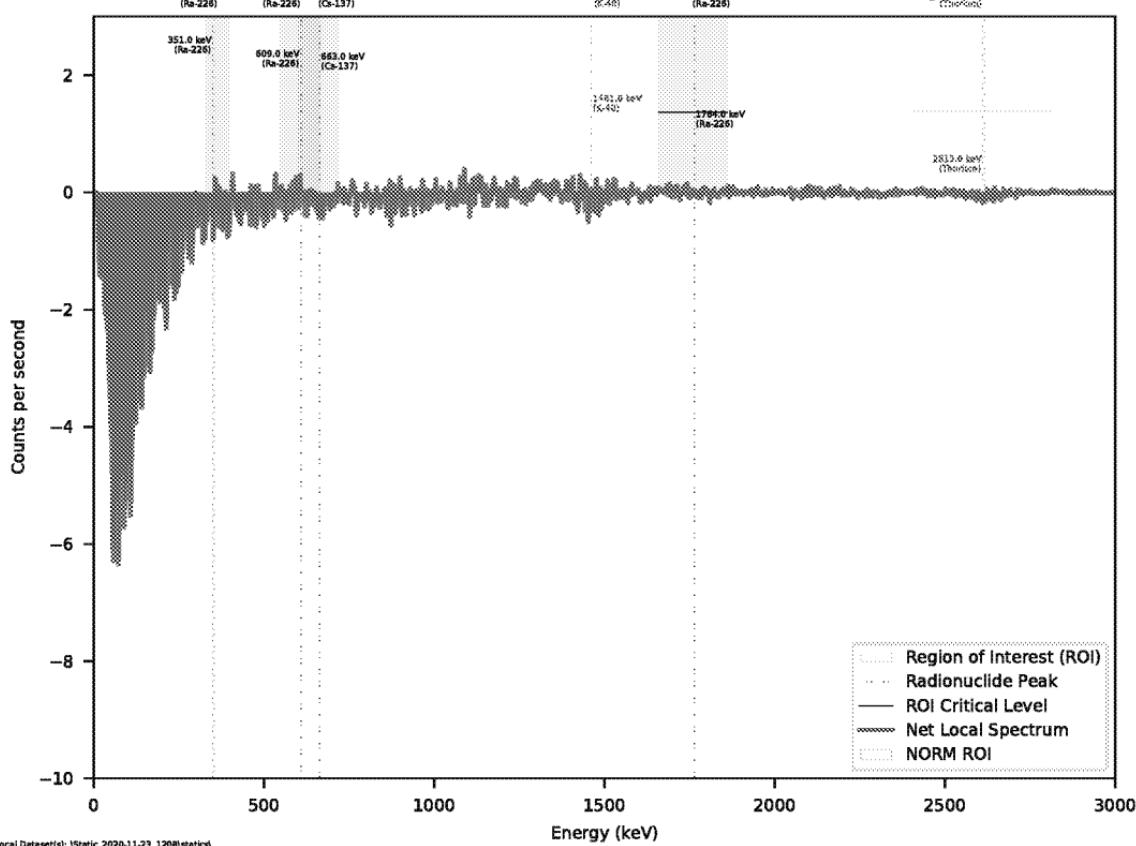
## Net Gamma Spectrum, Static Location: 23

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## Net Gamma Spectrum, Static Location: 24

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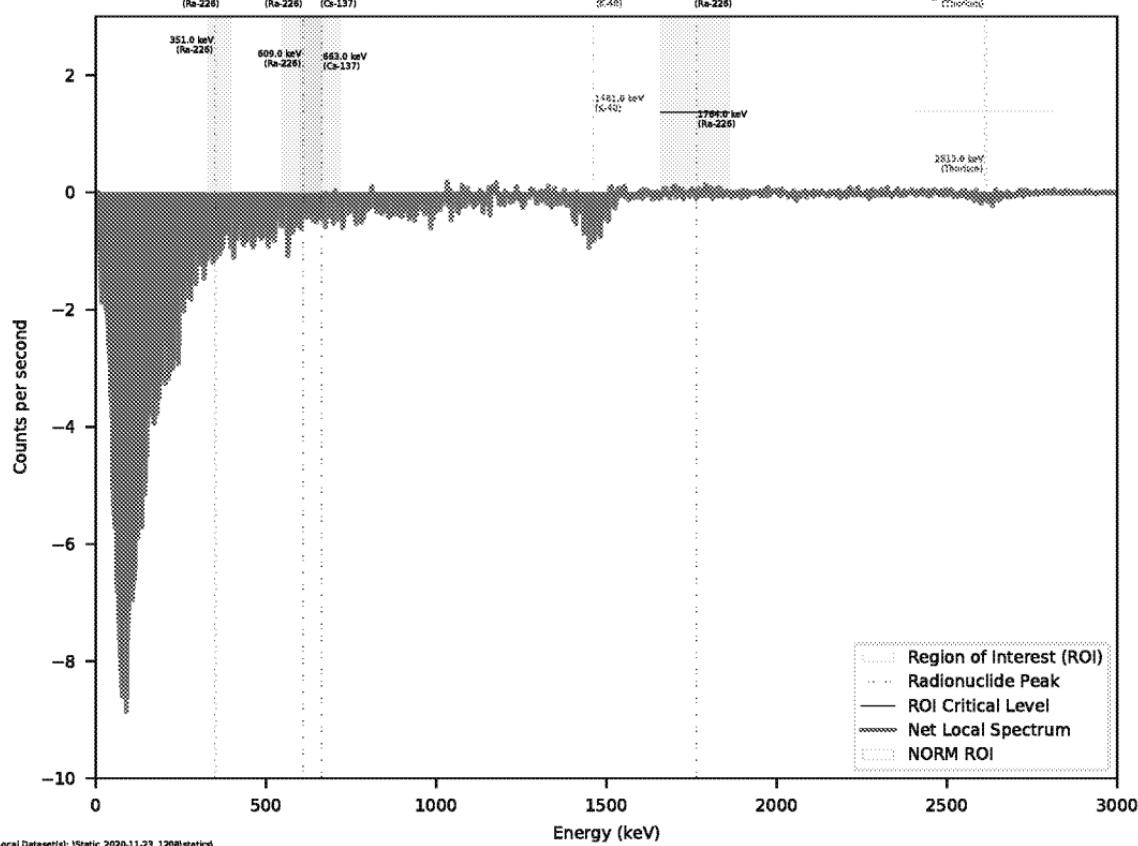
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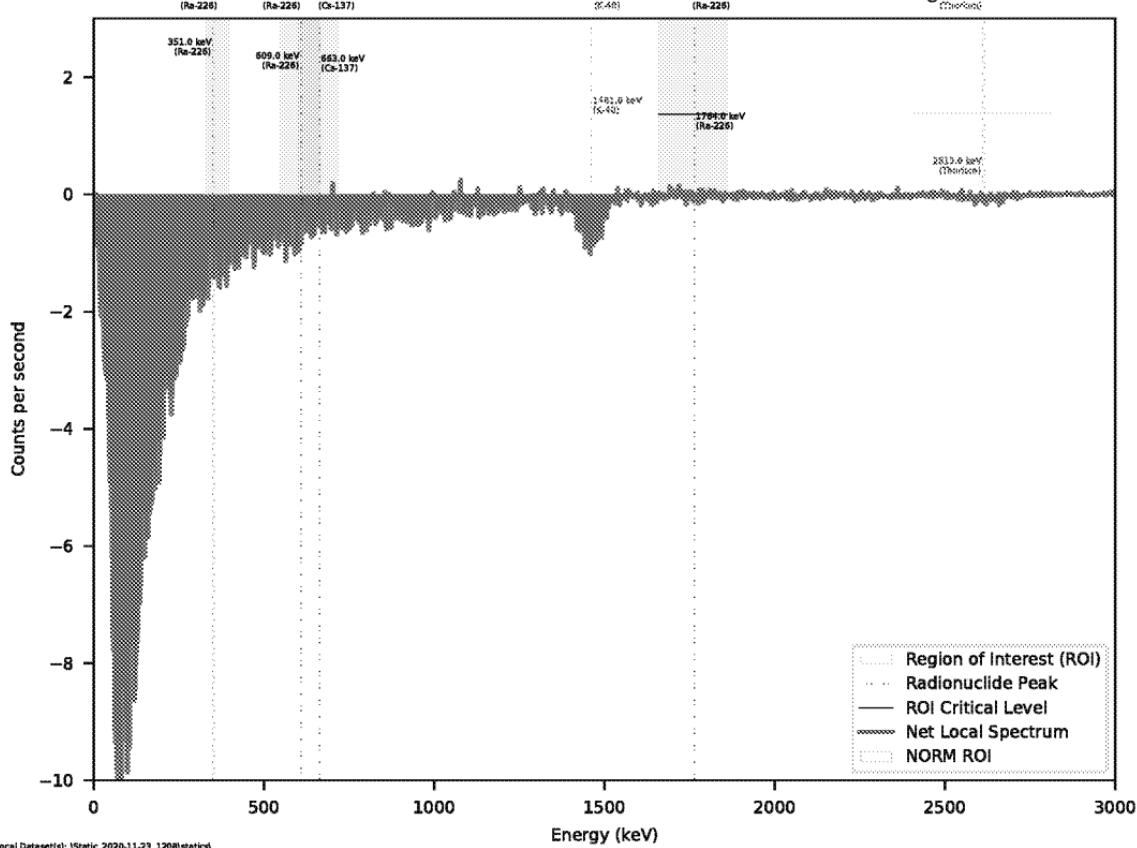
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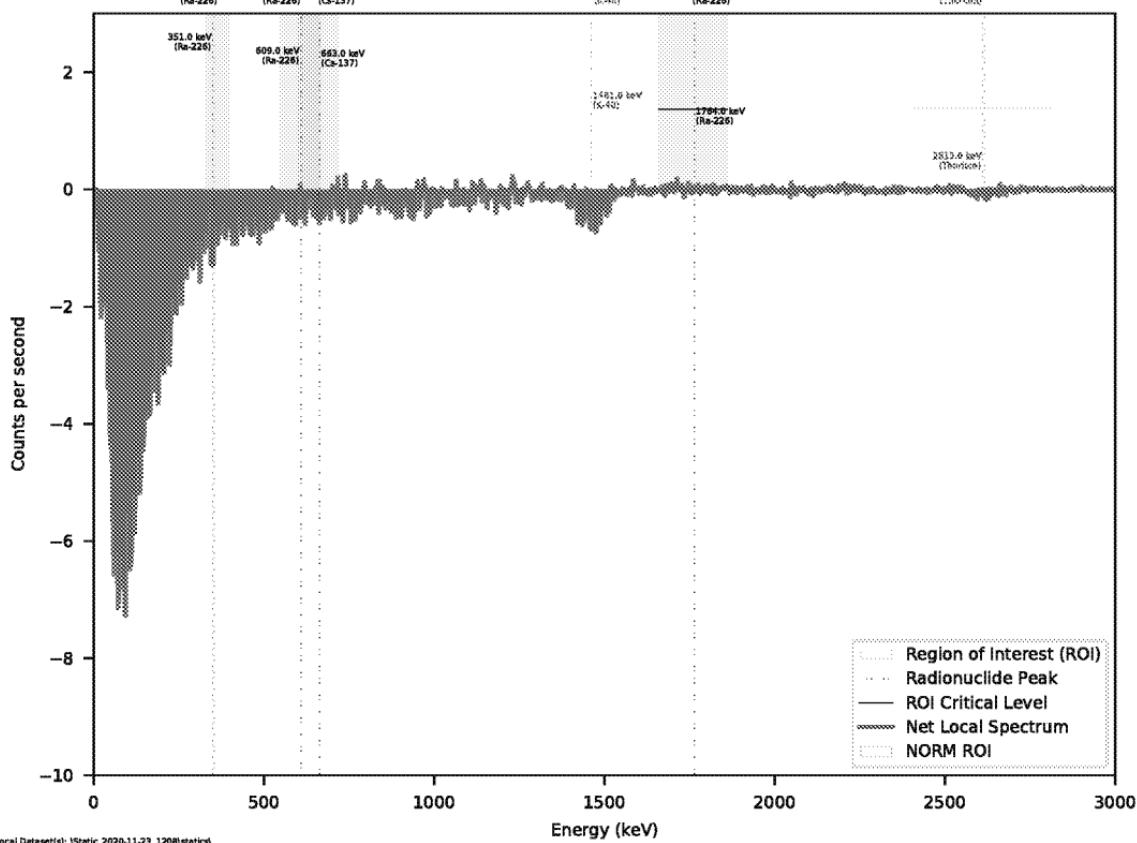
## Net Gamma Spectrum, Static Location: 26

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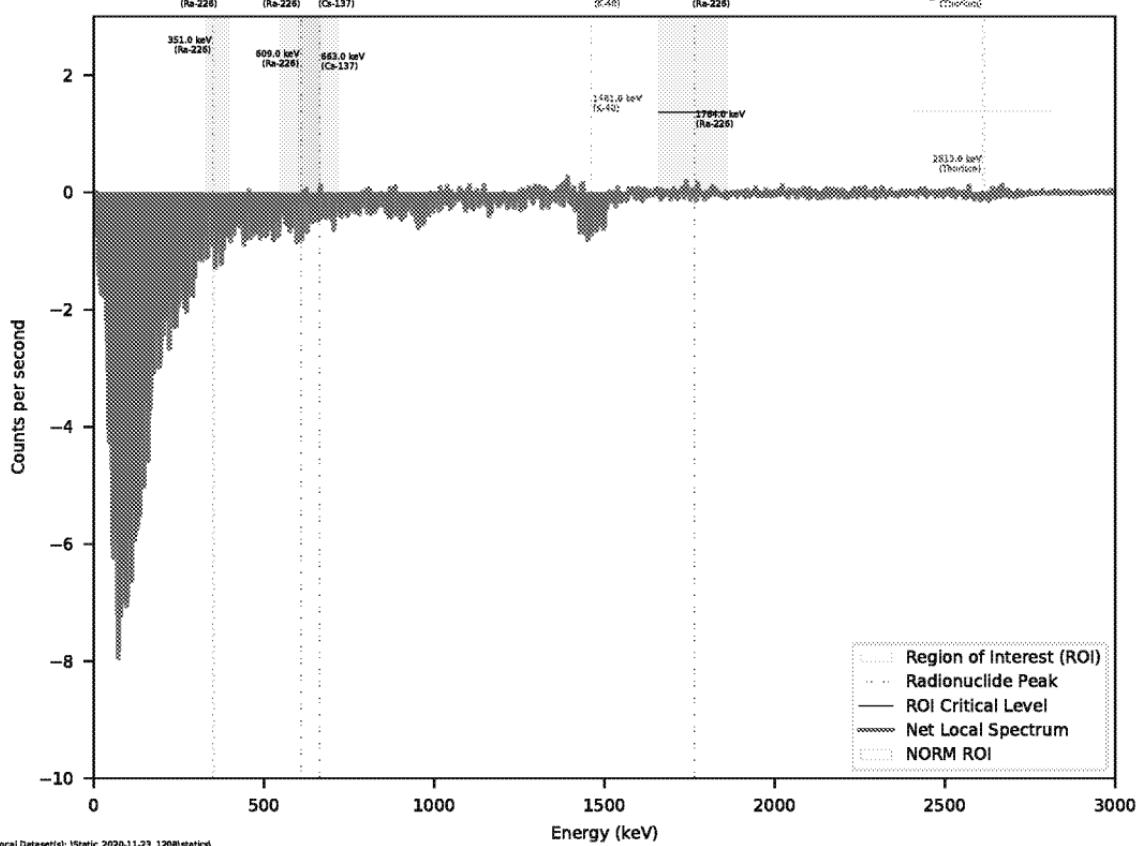
## Net Gamma Spectrum, Static Location: 27

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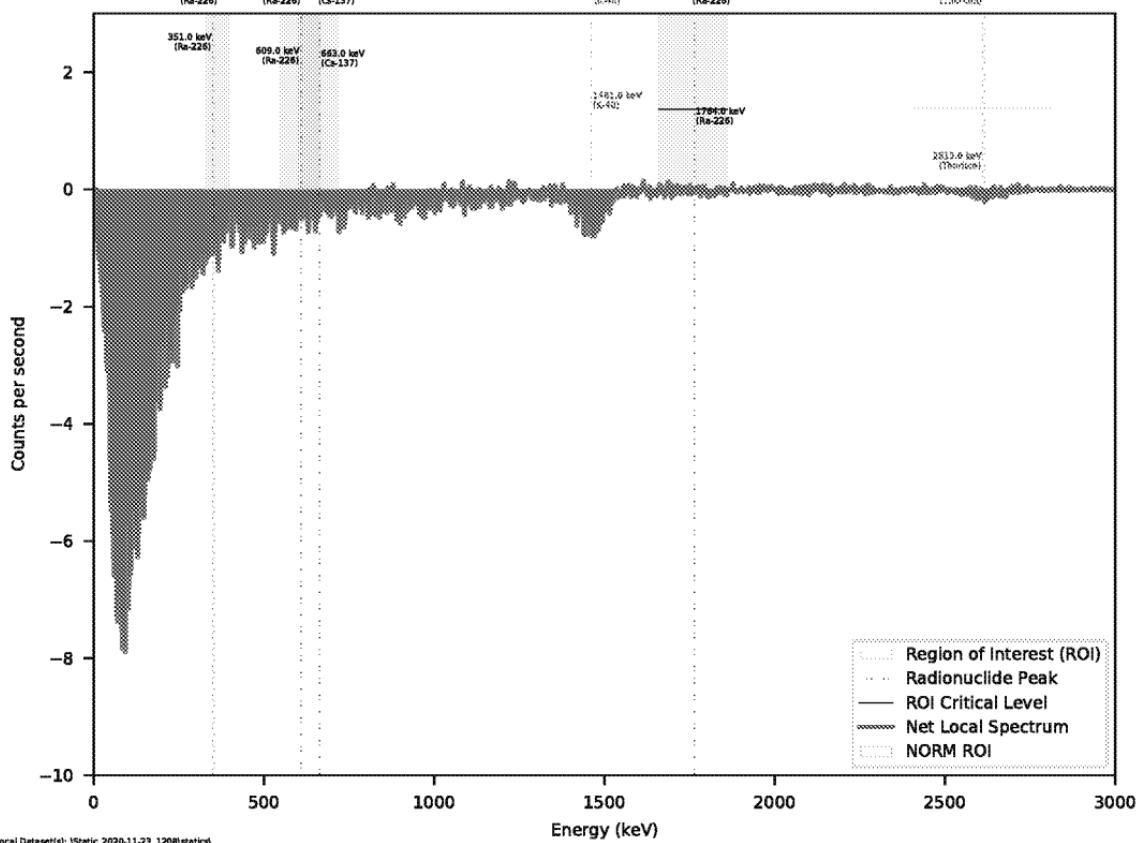
## Net Gamma Spectrum, Static Location: 28

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## Net Gamma Spectrum, Static Location: 29

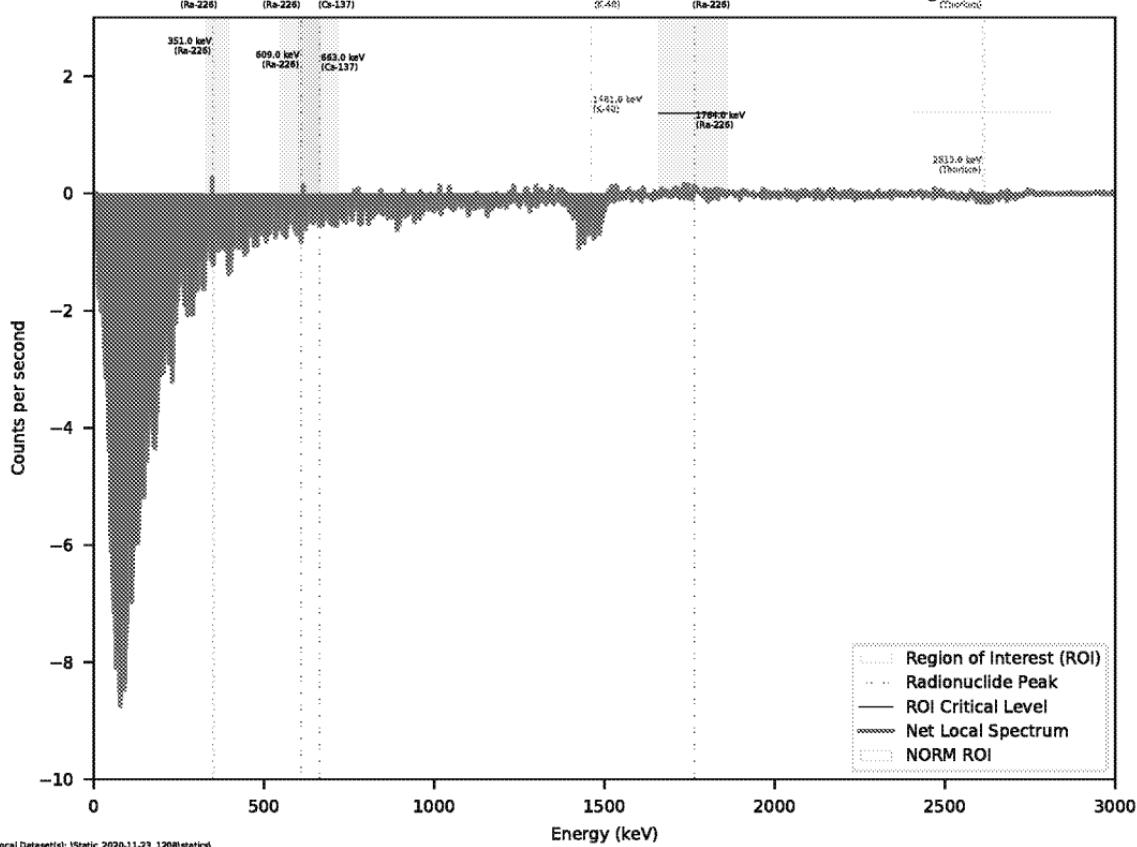
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ED\_006360A\_00000381-00042

## Net Gamma Spectrum, Static Location: 30

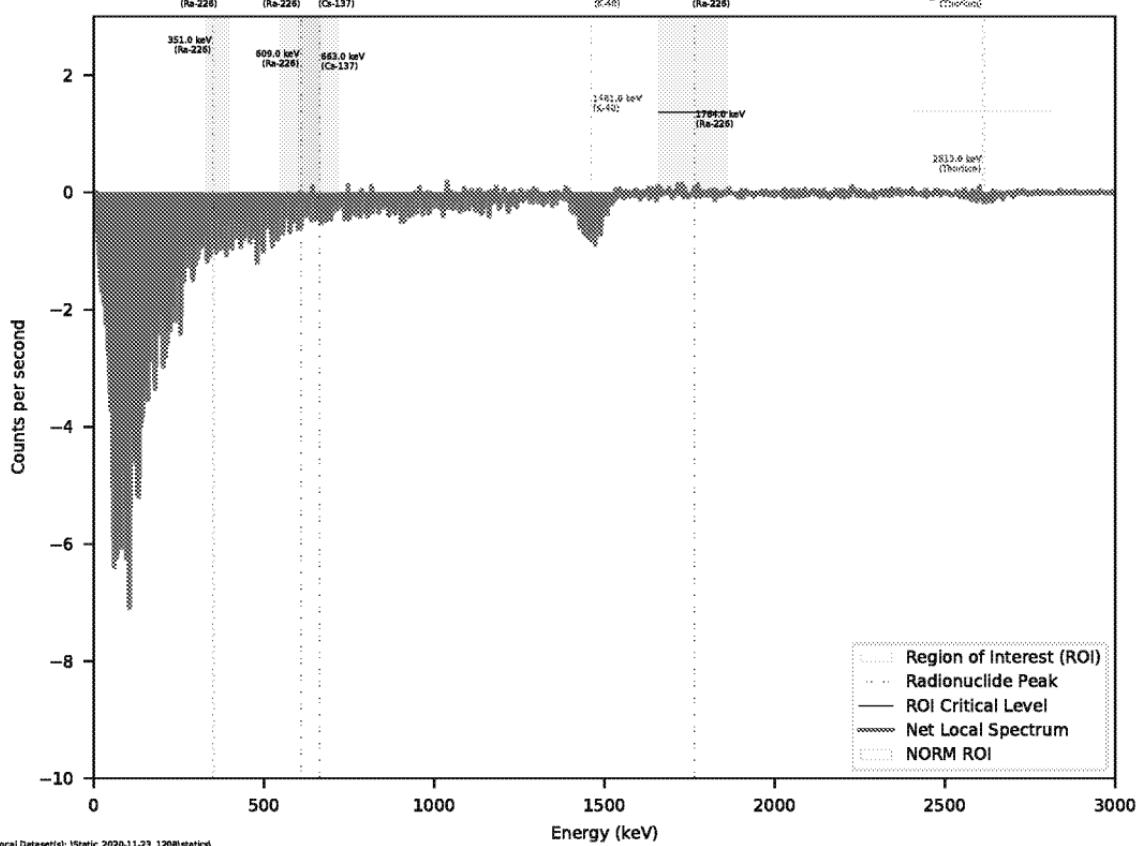
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ED\_006360A\_00000381-00043

## Net Gamma Spectrum, Static Location: 31

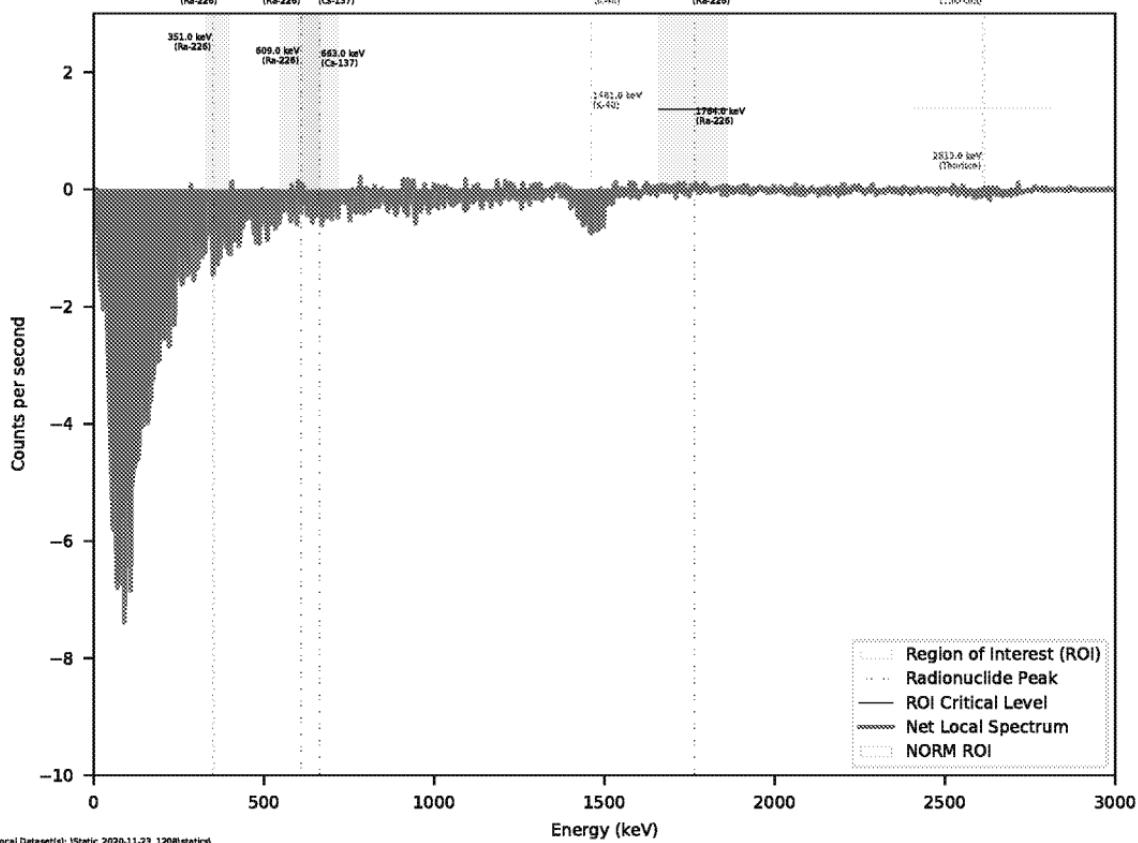
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ED\_006360A\_00000381-00044

## Net Gamma Spectrum, Static Location: 32

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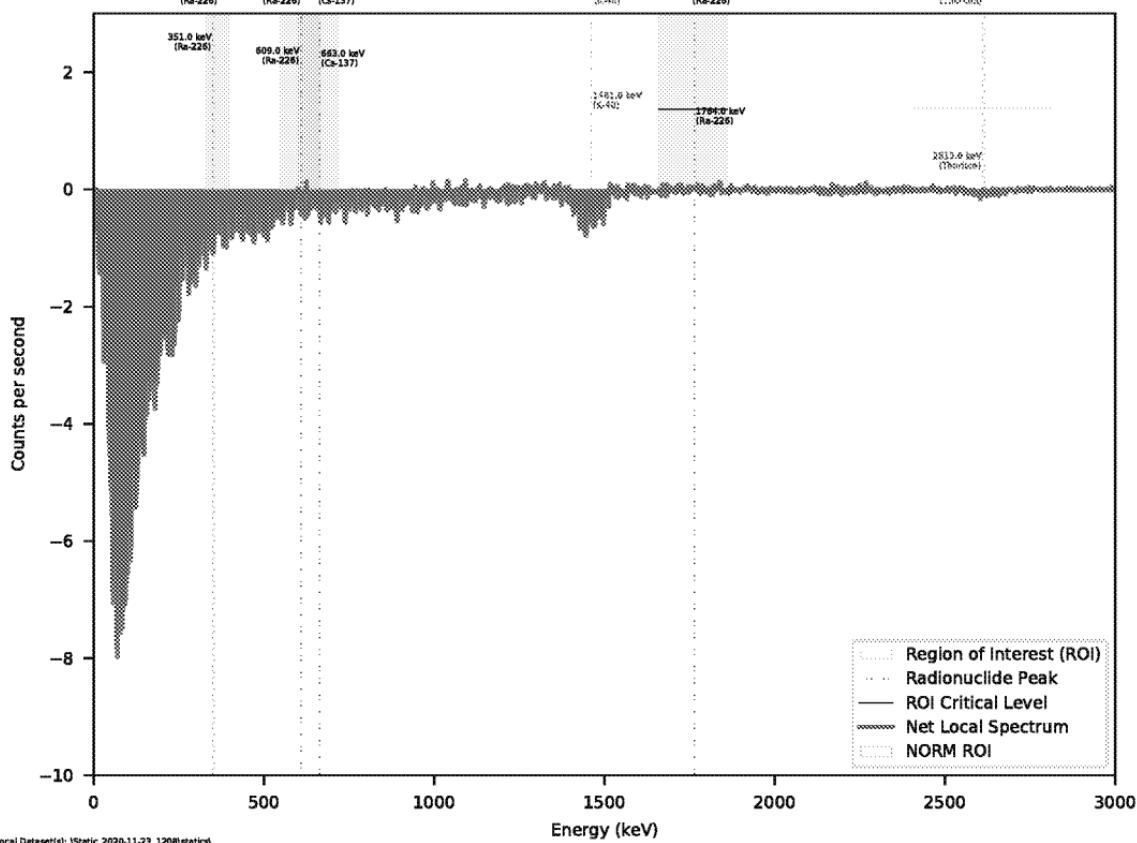
Local Dataset(s): lStatic\_2020-11-23\_1200\static  
Background Dataset(s): RS2\_SoilRBA\_Static.csv

Local Coordinates (Longitude, Latitude): -122.36463220294118, 37.72410404411763

ED\_006360A\_00000381-00045

## Net Gamma Spectrum, Static Location: 33

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Local Dataset(s): lStatic\_2020-11-23\_1200\static  
Background Dataset(s): RSII\_SoilRBA\_Static.csv

Local Coordinates (Longitude, Latitude): -122.3644284000006, 37.72409177777804

ED\_006360A\_00000381-00046



## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40588-1  
Laboratory Sample Delivery Group: GJ46599767  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
4/12/2021 4:06:43 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

#### LINKS

Review your project  
results through

**Total Access**

Have a Question?

Ask—  
The  
Expert

Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40588-1  
SDG: GJ46599767

**Job ID: 160-40588-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40588-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

## Job ID: 160-40588-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/27/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 14.7 C.

#### STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU108B-001 (160-40588-1), HPPG-ESU-TU108B-011 (160-40588-11), HPPG-ESU-TU108B-021 (160-40588-21) and HPPG-F-041 (160-40588-26) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/30/2020, prepared on 12/03/2020 and analyzed on 12/14/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU108B-001 (160-40588-1), HPPG-ESU-TU108B-011 (160-40588-11), HPPG-ESU-TU108B-021 (160-40588-21) and HPPG-F-041 (160-40588-26).

The strontium carrier recovery is outside the lower control limit (40%) for the duplicate sample in batch 160-490804: 160-39992-A-30-D DU. The detection goal was not met for these samples due to the low carrier recovery from the presence of matrix interference apparent during the initial preparation of the sample. The QC associated with these samples fell within acceptable criteria demonstrating acceptable preparation and instrument performance. The data have been reported with this narrative.

The laboratory control sample (LCS) associated with the following samples in batch 160-490804 falls below the lower limit for spike criteria (recovery is 74%; criteria is 75-125%): HPPG-ESU-TU108B-001 (160-40588-1), HPPG-ESU-TU108B-011 (160-40588-11), HPPG-ESU-TU108B-021 (160-40588-21), HPPG-F-041 (160-40588-26), (160-39992-A-30-C) and (160-39992-A-30-D DU). The other QC associated with this batch (MB, RER for duplicate precision, carrier recoveries associated) fall within acceptable criteria demonstrating acceptable preparation and instrument performance. The LCS recovery is within statistical limits of 59-124%. The data have been reported with this narrative by client approval.

The following sample in batch 160-490804 exhibited a negative result greater in magnitude than the 3 sigma TPU: HPPG-F-041 (160-40588-26). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The following samples in batch 160-490804 were prepped in multiple tubes during fuming nitric wash due to the pellet size indicating matrix interference: HPPG-F-041 (160-40588-26), and 160-39992-30 DU. Sample 160-40588-26 was split between five tubes. Samples 160-39992-30 and 160-39992-30 DU were split between two tubes each.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490804/22-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU108B-001 (160-40588-1), HPPG-ESU-TU108B-002 (160-40588-2), HPPG-ESU-TU108B-003 (160-40588-3), HPPG-ESU-TU108B-004 (160-40588-4), HPPG-ESU-TU108B-005 (160-40588-5), HPPG-ESU-TU108B-006 (160-40588-6), HPPG-ESU-TU108B-007 (160-40588-7), HPPG-ESU-TU108B-008 (160-40588-8), HPPG-ESU-TU108B-009 (160-40588-9), HPPG-ESU-TU108B-010 (160-40588-10), HPPG-ESU-TU108B-011 (160-40588-11), HPPG-ESU-TU108B-012 (160-40588-12), HPPG-ESU-TU108B-013 (160-40588-13), HPPG-ESU-TU108B-014 (160-40588-14), HPPG-ESU-TU108B-015 (160-40588-15), HPPG-ESU-TU108B-016 (160-40588-16), HPPG-ESU-TU108B-017 (160-40588-17), HPPG-ESU-TU108B-018 (160-40588-18), HPPG-ESU-TU108B-019 (160-40588-19), HPPG-ESU-TU108B-020 (160-40588-20), HPPG-ESU-TU108B-021 (160-40588-21), HPPG-ESU-TU108B-022 (160-40588-22), HPPG-ESU-TU108B-023 (160-40588-23), HPPG-ESU-TU108B-024 (160-40588-24), HPPG-ESU-TU108B-025 (160-40588-25), HPPG-F-041 (160-40588-26) and HPPG-F-042 (160-40588-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/30/2020, prepared on 12/02/2020 and analyzed on 12/23/2020 and 12/24/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

### Job ID: 160-40588-1 (Continued)

#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 490768

The cesium-137 detection goal of 0.0700 pCi/g was not met for sample HPPG-F-042 (160-40588-27) in batch 160-490768. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The method blank (MB) z-score is within limits and is stored in the level IV raw data.(MB 160-490768/1-A)

Gamma prep batch 490763

The Radium-226 DLC (0.259 pCi/g) and Cesium-137 DLC (0.0813 pCi/g) are above the requested limits (RLs) of 0.200 pCi/g and 0.0700 pCi/g, respectively for the method blank (MB 160-490763/1-A) associated with batch 160-490763. Radium-226 and Cesium-137 activity was not observed above the RL in the MB. The data have been reported with the DLC achieved.

The method blank (MB) z-score is within limits and is stored in the level IV raw data.(MB 160-490763/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-039

Page 1 of 4

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Page 6 of 35

				Analysis Requested						
				Standard-90 (EPA 905 M0D)						
				Ground Spec (EPA 901.1 M) - Fm121						
Project Number:	501197	Project Name:	Hunters Point Naval Shipyard: Parcel G Remedial Action	Waybill Number:	49570125 (207)	Lab Destination:	Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046	Sample Spec (EPA 905 M0D)	Standard-90 (EPA 901.1 M) - Fm121	Comments
Project Location:	San Francisco, CA	Purchase Order #:	1159058	Shipment/Pickup Date:	11/25/2020	Matrix:	Preservatives (water)	Dose Rate uR/Hr	Evidence Bag ID	
Lab Contact Name/ph #	Rhoeda Ridenbower (314)298-8566 <th># of Containers:</th> <td>1</td> <th>Container Type:</th> <td>16 oz. plastic jar</td> <th>Preservatives (soil)</th> <td>X</td> <td>X</td> <td></td> <td></td>	# of Containers:	1	Container Type:	16 oz. plastic jar	Preservatives (soil)	X	X		
HPPG-ESU-TU108B-001	11/21/2020	09:42	G	SO	1	16 oz. plastic jar	X	X	4	GJ46599767
HPPG-ESU-TU108B-002	11/21/2020	09:40	G	SO	1	16 oz. plastic jar	X		4	GJ46599767
HPPG-ESU-TU108B-003	11/21/2020	09:43	G	SO	1	16 oz. plastic jar	X		4	GJ46599767
HPPG-ESU-TU108B-004	11/21/2020	09:44	G	SO	1	16 oz. plastic jar	X		4	GJ46599767
HPPG-ESU-TU108B-005	11/21/2020	09:47	G	SO	1	16 oz. plastic jar	X		4	GJ46599767
HPPG-ESU-TU108B-006	11/21/2020	09:52	G	SO	1	16 oz. plastic jar	X		4	GJ46599767
HPPG-ESU-TU108B-007	11/21/2020	09:53	G	SO	1	16 oz. plastic jar	X		4	GJ46599767
HPPG-ESU-TU108B-008	11/21/2020	10:06	G	SO	1	16 oz. plastic jar	X		4	GJ46599767

## Special Instructions:

21 day ingrowth results only

Turnaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I	II	III	Project Specific
Method Codes C = Composite; G = Grab      Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening									

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/21/2020 14:35	Locked Storage(Kevin Hoch)		11/21/2020 14:35
Locked Storage(Kevin Hoch)		11/25/2020 07:36	Devin Lewis		11/25/2020 07:36
Devin Lewis		11/25/2020 11:07	SHIPPEDTOLAB	 MICHAEL KORRIN	11/25/2020 09:12

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



ED\_006360A\_00000381-00052



## CHAIN OF CUSTODY

Ref. Document # 501197RSY-039

Page 2 of 4

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-9769  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197

Hunters Point Naval Shipyard: Parcel

Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 11/25/2020

Waybill Number: 4157 0225 6207

Test America (St. Louis Lab)

Lab Destination: 13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #

Rhoeda Ridenbower (314)298-8566

	Collection Information				Matrix	# of Containers	Preservatives (water)		Storage Spec (EPA 801.1M) - Full 21 day in glove bag name	Storage Spec (EPA 805 M0D)	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Sample ID	Date	Time	Method			Container Type	Preservatives (soil)					
HPPG-ESU-TU108B-009	11/21/2020	10:01	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-010	11/21/2020	09:56	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-011	11/21/2020	10:14	G	SO	1	1	16 oz. plastic jar	X	X		4	GJ46599767	
HPPG-ESU-TU108B-012	11/21/2020	10:04	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-013	11/21/2020	10:07	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-014	11/21/2020	10:18	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-015	11/21/2020	10:22	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-016	11/21/2020	10:26	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-017	11/21/2020	10:28	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-018	11/21/2020	10:29	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-019	11/21/2020	10:31	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-020	11/21/2020	10:34	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-021	11/21/2020	10:35	G	SO	1	1	16 oz. plastic jar	X	X		4	GJ46599767	
HPPG-ESU-TU108B-022	11/21/2020	10:39	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-023	11/21/2020	10:42	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-024	11/21/2020	10:46	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	
HPPG-ESU-TU108B-025	11/21/2020	10:48	G	SO	1	1	16 oz. plastic jar	X			4	GJ46599767	



## CHAIN OF CUSTODY

APTM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

### Sample Tech(s):

Project Number: 601192

## Hunters Point Naval Shipyard: Parce

Project Name: G Remedial Action

**Project Location:** San Francisco, CA

Purchase Order #: 1159051

Shipment/Pickup Date: 11/25/2020

n 4457 class 80

Test America (St. Louis, La.)

13715 Rider Trail N

Lab Contact Name/ph #

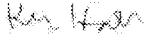
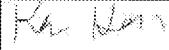
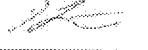
Contact Name/ph #: Rhonda Bidsenbowier /314)288-8561

#### Preservatives (water)

#### Preservatives (soil)

	Collection Information				Matrix	# of Conta	Preservatives (soil)					
	Date	Time	Method				Container Type					
HPPG-F-041	11/21/2020	10:14	G	SO	1	16 oz. plastic jar	X	X		4	GJ46599767	
HPPG-F-042	11/21/2020	10:26	G	SO	1	16 oz. plastic jar	X			4	GJ46599767	

## All Transfers for COC 501197RSY-039

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/21/2020 14:35	Locked Storage(Kevin Hoch)		11/21/2020 14:35
Locked Storage(Kevin Hoch)		11/25/2020 07:36	Devin Lewis		11/25/2020 07:36
Devin Lewis		11/25/2020 11:07	SHIPPEDTOLAB	MICHAEL KORR TNH MICHAKORRTNHDER	11/27/2020 09:12

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40588-1  
SDG Number: GJ46599767**Login Number:** 40588**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Greer, Diane A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

## Qualifiers

Rad Qualifier	Qualifier Description
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40588-1  
SDG: GJ46599767

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

### Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

### Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40588-1	HPPG-ESU-TU108B-001	Solid	11/21/20 09:42	11/27/20 09:12	
160-40588-2	HPPG-ESU-TU108B-002	Solid	11/21/20 09:40	11/27/20 09:12	
160-40588-3	HPPG-ESU-TU108B-003	Solid	11/21/20 09:43	11/27/20 09:12	
160-40588-4	HPPG-ESU-TU108B-004	Solid	11/21/20 09:44	11/27/20 09:12	
160-40588-5	HPPG-ESU-TU108B-005	Solid	11/21/20 09:47	11/27/20 09:12	
160-40588-6	HPPG-ESU-TU108B-006	Solid	11/21/20 09:52	11/27/20 09:12	
160-40588-7	HPPG-ESU-TU108B-007	Solid	11/21/20 09:53	11/27/20 09:12	
160-40588-8	HPPG-ESU-TU108B-008	Solid	11/21/20 10:06	11/27/20 09:12	
160-40588-9	HPPG-ESU-TU108B-009	Solid	11/21/20 10:01	11/27/20 09:12	
160-40588-10	HPPG-ESU-TU108B-010	Solid	11/21/20 09:56	11/27/20 09:12	
160-40588-11	HPPG-ESU-TU108B-011	Solid	11/21/20 10:14	11/27/20 09:12	
160-40588-12	HPPG-ESU-TU108B-012	Solid	11/21/20 10:04	11/27/20 09:12	
160-40588-13	HPPG-ESU-TU108B-013	Solid	11/21/20 10:07	11/27/20 09:12	
160-40588-14	HPPG-ESU-TU108B-014	Solid	11/21/20 10:18	11/27/20 09:12	
160-40588-15	HPPG-ESU-TU108B-015	Solid	11/21/20 10:22	11/27/20 09:12	
160-40588-16	HPPG-ESU-TU108B-016	Solid	11/21/20 10:26	11/27/20 09:12	
160-40588-17	HPPG-ESU-TU108B-017	Solid	11/21/20 10:28	11/27/20 09:12	
160-40588-18	HPPG-ESU-TU108B-018	Solid	11/21/20 10:29	11/27/20 09:12	
160-40588-19	HPPG-ESU-TU108B-019	Solid	11/21/20 10:31	11/27/20 09:12	
160-40588-20	HPPG-ESU-TU108B-020	Solid	11/21/20 10:34	11/27/20 09:12	
160-40588-21	HPPG-ESU-TU108B-021	Solid	11/21/20 10:35	11/27/20 09:12	
160-40588-22	HPPG-ESU-TU108B-022	Solid	11/21/20 10:39	11/27/20 09:12	
160-40588-23	HPPG-ESU-TU108B-023	Solid	11/21/20 10:42	11/27/20 09:12	
160-40588-24	HPPG-ESU-TU108B-024	Solid	11/21/20 10:46	11/27/20 09:12	
160-40588-25	HPPG-ESU-TU108B-025	Solid	11/21/20 10:48	11/27/20 09:12	
160-40588-26	HPPG-F-041	Solid	11/21/20 10:14	11/27/20 09:12	
160-40588-27	HPPG-F-042	Solid	11/21/20 10:26	11/27/20 09:12	

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-001**

**Lab Sample ID: 160-40588-1**

Date Collected: 11/21/20 09:42

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.0974	U J	0.135	0.135	0.331	0.119	pCi/g	12/03/20 11:35	12/14/20 17:08	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	98.0		40 - 110					12/03/20 11:35	12/14/20 17:08	1
Y Carrier	91.6		40 - 110					12/03/20 11:35	12/14/20 17:08	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.506		0.128	0.138		0.0462	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Actinium-227	0.162	U	0.348	0.348		0.227	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Bismuth-212	-0.351	U	0.585	0.586		0.454	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Bismuth-214	0.0949	U	0.122	0.123		0.109	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Cesium-137	-0.0122	U	0.0556	0.0556	0.0700	0.0450	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Lead-210	0.496	U	0.977	0.978		0.777	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Lead-212	0.338		0.0664	0.0795		0.0313	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Lead-214	0.303		0.0890	0.0944		0.0400	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Potassium-40	8.45		1.07	1.38		0.0790	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Protactinium-231	-0.0000000	U	2.01	2.01		1.66	pCi/g	12/02/20 13:00	12/23/20 11:45	1
	733									
Protactinium-234	-0.0812	U	0.232	0.232		0.189	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Radium-226	0.0949	U	0.122	0.123	0.200	0.109	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Radium-228	0.506		0.128	0.138		0.0462	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Thallium-208	0.134		0.0371	0.0397		0.00894	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Thorium 228	0.338		0.0664	0.0795		0.0313	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Thorium-232	0.506		0.128	0.138		0.0462	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Thorium-234	0.581		0.368	0.374		0.281	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Uranium-235	0.0114	U	0.0148	0.0149		0.179	pCi/g	12/02/20 13:00	12/23/20 11:45	1
Uranium-238	0.581		0.368	0.374		0.281	pCi/g	12/02/20 13:00	12/23/20 11:45	1

**Client Sample ID: HPPG-ESU-TU108B-002**

**Lab Sample ID: 160-40588-2**

Date Collected: 11/21/20 09:40

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.566		0.181	0.193		0.0338	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Actinium-227	0.148	U	0.424	0.425		0.352	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Bismuth-212	0.551	U	1.04	1.04		0.816	pCi/g	12/02/20 13:00	12/23/20 11:46	1
<b>Bismuth-214</b>	<b>0.309</b>		0.128	0.133		0.0576	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Cesium-137	-0.00455	U	0.0828	0.0828	0.0700	0.0470	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Lead-210	1.80		1.61	1.63		0.988	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Lead-212	0.385		0.102	0.112		0.0585	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Lead-214	0.476		0.128	0.140		0.0650	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Potassium-40	8.60		1.44	1.75		0.299	pCi/g	12/02/20 13:00	12/23/20 11:46	1
Protactinium-231	0.756	U	2.49	2.49		2.02	pCi/g	12/02/20 13:00	12/23/20 11:46	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-002**  
Date Collected: 11/21/20 09:40  
Date Received: 11/27/20 09:12

**Lab Sample ID: 160-40588-2**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Protactinium-234	0.0747	U		0.300	0.300		0.265	pCi/g	12/02/20 13:00	12/23/20 11:46
Radium-226	0.309			0.128	0.133	0.200	0.0576	pCi/g	12/02/20 13:00	12/23/20 11:46
Radium-228	0.566			0.181	0.193		0.0338	pCi/g	12/02/20 13:00	12/23/20 11:46
Thallium-208	0.181			0.0629	0.0663		0.0255	pCi/g	12/02/20 13:00	12/23/20 11:46
Thorium 228	0.385			0.102	0.112		0.0585	pCi/g	12/02/20 13:00	12/23/20 11:46
Thorium-232	0.566			0.181	0.193		0.0338	pCi/g	12/02/20 13:00	12/23/20 11:46
Thorium-234	-0.928	U		0.967	0.974		0.941	pCi/g	12/02/20 13:00	12/23/20 11:46
Uranium-235	-0.250	U		0.655	0.656		0.533	pCi/g	12/02/20 13:00	12/23/20 11:46
Uranium-238	-0.928	U		0.967	0.974		0.941	pCi/g	12/02/20 13:00	12/23/20 11:46

**Client Sample ID: HPPG-ESU-TU108B-003**

**Lab Sample ID: 160-40588-3**

Date Collected: 11/21/20 09:43

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.446			0.160	0.166		0.0933	pCi/g	12/02/20 13:00	12/23/20 12:25
Actinium-227	0.157	U		0.304	0.305		0.257	pCi/g	12/02/20 13:00	12/23/20 12:25
Bismuth-212	-0.0138	U		0.676	0.676		0.556	pCi/g	12/02/20 13:00	12/23/20 12:25
Bismuth-214	0.366			0.115	0.121		0.0509	pCi/g	12/02/20 13:00	12/23/20 12:25
Cesium-137	0.000597	U		0.0791	0.0791	0.0700	0.0651	pCi/g	12/02/20 13:00	12/23/20 12:25
Lead-210	1.04			1.48	1.48		0.971	pCi/g	12/02/20 13:00	12/23/20 12:25
Lead-212	0.423			0.0872	0.0978		0.0387	pCi/g	12/02/20 13:00	12/23/20 12:25
Lead-214	0.344			0.109	0.114		0.0697	pCi/g	12/02/20 13:00	12/23/20 12:25
Potassium-40	8.44			1.29	1.54		0.114	pCi/g	12/02/20 13:00	12/23/20 12:25
Protactinium-231	0.000	U		1.00	1.00		2.13	pCi/g	12/02/20 13:00	12/23/20 12:25
Protactinium-234	0.0777	U		0.278	0.278		0.226	pCi/g	12/02/20 13:00	12/23/20 12:25
Radium-226	0.366			0.115	0.121	0.200	0.0509	pCi/g	12/02/20 13:00	12/23/20 12:25
Radium-228	0.446			0.160	0.166		0.0933	pCi/g	12/02/20 13:00	12/23/20 12:25
Thallium-208	0.213			0.0519	0.0562		0.00732	pCi/g	12/02/20 13:00	12/23/20 12:25
Thorium 228	0.423			0.0872	0.0978		0.0387	pCi/g	12/02/20 13:00	12/23/20 12:25
Thorium-232	0.446			0.160	0.166		0.0933	pCi/g	12/02/20 13:00	12/23/20 12:25
Thorium-234	-0.896	U		0.650	0.657		0.819	pCi/g	12/02/20 13:00	12/23/20 12:25
Uranium-235	-0.0204	U		0.0775	0.0776		0.386	pCi/g	12/02/20 13:00	12/23/20 12:25
Uranium-238	-0.896	U		0.650	0.657		0.819	pCi/g	12/02/20 13:00	12/23/20 12:25

**Client Sample ID: HPPG-ESU-TU108B-004**

**Lab Sample ID: 160-40588-4**

Date Collected: 11/21/20 09:44

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.459			0.180	0.186		0.0411	pCi/g	12/02/20 13:00	12/23/20 12:27
Actinium-227	0.101	U		0.258	0.258		0.424	pCi/g	12/02/20 13:00	12/23/20 12:27

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-004**

**Lab Sample ID: 160-40588-4**

Date Collected: 11/21/20 09:44

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.00438	U	0.756	0.756		0.235	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Bismuth-214</b>	<b>0.362</b>		0.140	0.145		0.0722	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Cesium-137	-0.0239	U	0.0743	0.0744	0.0700	0.0568	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Lead-210	0.806	U	1.44	1.45		0.984	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Lead-212</b>	<b>0.452</b>		0.0912	0.108		0.0294	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Lead-214</b>	<b>0.357</b>		0.123	0.128		0.0696	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Potassium-40	8.43		1.59	1.81		0.280	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Protactinium-231	0.000	U	0.664	0.664		2.14	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Protactinium-234	-0.0116	U	0.0300	0.0300		0.205	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Radium-226</b>	<b>0.362</b>		0.140	0.145	0.200	0.0722	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Radium-228</b>	<b>0.459</b>		0.180	0.186		0.0411	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Thallium-208	0.0941		0.106	0.107		0.0537	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Thorium 228</b>	<b>0.452</b>		0.0912	0.108		0.0294	pCi/g	12/02/20 13:00	12/23/20 12:27	1
<b>Thorium-232</b>	<b>0.459</b>		0.180	0.186		0.0411	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Thorium-234	-0.0987	U	0.929	0.929		0.767	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Uranium-235	0.0921	U	0.209	0.209		0.308	pCi/g	12/02/20 13:00	12/23/20 12:27	1
Uranium-238	-0.0987	U	0.929	0.929		0.767	pCi/g	12/02/20 13:00	12/23/20 12:27	1

**Client Sample ID: HPPG-ESU-TU108B-005**

**Lab Sample ID: 160-40588-5**

Date Collected: 11/21/20 09:47

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.229</b>		0.151	0.152		0.0804	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Actinium-227	0.106	U	0.224	0.224		0.248	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Bismuth-212	0.134	U	0.421	0.421		0.331	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Bismuth-214</b>	<b>0.331</b>		0.0914	0.0977		0.0371	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Cesium-137	-0.0135	U	0.0438	0.0438	0.0700	0.0349	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Lead-210	-0.167	U	1.26	1.26		1.03	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Lead-212</b>	<b>0.300</b>		0.0615	0.0727		0.0268	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Lead-214</b>	<b>0.364</b>		0.0956	0.103		0.0413	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Potassium-40	7.36		1.06	1.30		0.233	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Protactinium-231	-0.667	U	2.10	2.10		1.71	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Protactinium-234	-0.00509	U	0.0104	0.0104		0.192	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Radium-226</b>	<b>0.331</b>		0.0914	0.0977	0.200	0.0371	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Radium-228</b>	<b>0.229</b>		0.151	0.152		0.0804	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Thallium-208	0.152		0.0439	0.0467		0.0145	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Thorium 228</b>	<b>0.300</b>		0.0615	0.0727		0.0268	pCi/g	12/02/20 13:00	12/23/20 12:26	1
<b>Thorium-232</b>	<b>0.229</b>		0.151	0.152		0.0804	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Thorium-234	0.121	U	0.826	0.826		0.677	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Uranium-235	0.147	U	0.279	0.279		0.290	pCi/g	12/02/20 13:00	12/23/20 12:26	1
Uranium-238	0.121	U	0.826	0.826		0.677	pCi/g	12/02/20 13:00	12/23/20 12:26	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-006**

**Lab Sample ID: 160-40588-6**

Matrix: Solid

Date Collected: 11/21/20 09:52  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.246		0.142	0.144		0.116	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Actinium-227	0.111	U	0.326	0.326		0.277	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Bismuth-212	-0.00488	U	0.729	0.729		0.600	pCi/g	12/02/20 13:00	12/23/20 12:37	1
<b>Bismuth-214</b>	<b>0.411</b>		0.109	0.117		0.0436	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Cesium-137	0.0198	U	0.0552	0.0552	0.0700	0.0440	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Lead-210	-1.52	U	2.94	2.95		2.40	pCi/g	12/02/20 13:00	12/23/20 12:37	1
<b>Lead-212</b>	<b>0.439</b>		0.0722	0.0919		0.0280	pCi/g	12/02/20 13:00	12/23/20 12:37	1
<b>Lead-214</b>	<b>0.367</b>		0.0832	0.0916		0.0511	pCi/g	12/02/20 13:00	12/23/20 12:37	1
<b>Potassium-40</b>	<b>8.43</b>		1.10	1.40		0.0833	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Protactinium-231	0.000	U	0.537	0.537		1.66	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Protactinium-234	0.0455	U	0.0670	0.0671		0.202	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Radium-226	0.411		0.109	0.117	0.200	0.0436	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Radium-228	0.246		0.142	0.144		0.116	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Thallium-208	0.155		0.0439	0.0468		0.0113	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Thorium 228	0.439		0.0722	0.0919		0.0280	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Thorium-232	0.246		0.142	0.144		0.116	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Thorium-234	0.548		0.404	0.409		0.303	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Uranium-235	0.0860	U	0.144	0.144		0.359	pCi/g	12/02/20 13:00	12/23/20 12:37	1
Uranium-238	0.548		0.404	0.409		0.303	pCi/g	12/02/20 13:00	12/23/20 12:37	1

**Client Sample ID: HPPG-ESU-TU108B-007**

**Lab Sample ID: 160-40588-7**

Matrix: Solid

Date Collected: 11/21/20 09:53  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.724		0.221	0.236		0.0341	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Actinium-227	-0.370	U	0.686	0.688		0.447	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Bismuth-212	-0.619	U	1.21	1.21		0.955	pCi/g	12/02/20 13:00	12/23/20 12:32	1
<b>Bismuth-214</b>	<b>0.543</b>		0.147	0.160		0.0524	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Cesium-137	0.000	U	0.0578	0.0578	0.0700	0.0608	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Lead-210	-0.807	U	1.84	1.84		1.55	pCi/g	12/02/20 13:00	12/23/20 12:32	1
<b>Lead-212</b>	<b>0.435</b>		0.105	0.117		0.0572	pCi/g	12/02/20 13:00	12/23/20 12:32	1
<b>Lead-214</b>	<b>0.487</b>		0.155	0.165		0.0648	pCi/g	12/02/20 13:00	12/23/20 12:32	1
<b>Potassium-40</b>	<b>11.3</b>		1.65	2.10		0.301	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Protactinium-231	0.805	U	2.82	2.82		2.29	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Protactinium-234	0.106	U	0.322	0.322		0.262	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Radium-226	0.543		0.147	0.160	0.200	0.0524	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Radium-228	0.724		0.221	0.236		0.0341	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Thallium-208	0.149		0.103	0.105		0.0426	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Thorium 228	0.435		0.105	0.117		0.0572	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Thorium-232	0.724		0.221	0.236		0.0341	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Thorium-234	-0.364	U	1.12	1.12		0.933	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Uranium-235	-0.238	U	0.595	0.595		0.518	pCi/g	12/02/20 13:00	12/23/20 12:32	1
Uranium-238	-0.364	U	1.12	1.12		0.933	pCi/g	12/02/20 13:00	12/23/20 12:32	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-008**  
Date Collected: 11/21/20 10:06  
Date Received: 11/27/20 09:12

**Lab Sample ID: 160-40588-8**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.592		0.175	0.185		0.0557	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Actinium-227	-0.394	U	0.748	0.749		0.452	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Bismuth-212	-0.306	U	0.878	0.879		0.698	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Bismuth-214</b>	<b>0.370</b>		0.142	0.147		0.0657	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Cesium-137	0.00236	U	0.0589	0.0589	0.0700	0.0483	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Lead-210</b>	<b>1.31</b>		1.41	1.42		0.921	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Lead-212</b>	<b>0.372</b>		0.0953	0.103		0.0531	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Lead-214</b>	<b>0.405</b>		0.137	0.143		0.0666	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Potassium-40</b>	<b>10.2</b>		1.44	1.77		0.118	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Protactinium-231	0.618	U	1.77	1.77		1.94	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Protactinium-234	0.0203	U	0.315	0.315		0.259	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Radium-226	0.370		0.142	0.147	0.200	0.0657	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Radium-228	0.592		0.175	0.185		0.0557	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Thallium-208	0.197		0.0574	0.0608		0.0138	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Thorium 228</b>	<b>0.372</b>		0.0953	0.103		0.0531	pCi/g	12/02/20 13:00	12/23/20 13:00	1
<b>Thorium-232</b>	<b>0.592</b>		0.175	0.185		0.0557	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Thorium-234	-0.963	U	0.672	0.680		0.908	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Uranium-235	0.0101	U	0.0200	0.0201		0.483	pCi/g	12/02/20 13:00	12/23/20 13:00	1
Uranium-238	-0.963	U	0.672	0.680		0.908	pCi/g	12/02/20 13:00	12/23/20 13:00	1

**Client Sample ID: HPPG-ESU-TU108B-009**

**Lab Sample ID: 160-40588-9**

Date Collected: 11/21/20 10:01

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.533		0.244	0.250		0.150	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Actinium-227	-0.321	U	0.708	0.709		0.427	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Bismuth-212	0.0230	U	0.872	0.872		0.715	pCi/g	12/02/20 13:00	12/23/20 13:04	1
<b>Bismuth-214</b>	<b>0.279</b>		0.140	0.143		0.0776	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Cesium-137	-0.0143	U	0.0831	0.0831	0.0700	0.0695	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Lead-210	-0.0869	U	1.43	1.43		1.02	pCi/g	12/02/20 13:00	12/23/20 13:04	1
<b>Lead-212</b>	<b>0.409</b>		0.0917	0.106		0.0386	pCi/g	12/02/20 13:00	12/23/20 13:04	1
<b>Lead-214</b>	<b>0.305</b>		0.117	0.121		0.0796	pCi/g	12/02/20 13:00	12/23/20 13:04	1
<b>Potassium-40</b>	<b>7.53</b>		2.21	2.34		0.879	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Protactinium-231	0.000	U	0.390	0.390		2.20	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Protactinium-234	0.0638	U	0.166	0.166		0.136	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Radium-226	0.279		0.140	0.143	0.200	0.0776	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Radium-228	0.533		0.244	0.250		0.150	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Thallium-208	0.0433	U	0.105	0.105		0.0487	pCi/g	12/02/20 13:00	12/23/20 13:04	1
<b>Thorium 228</b>	<b>0.409</b>		0.0917	0.106		0.0386	pCi/g	12/02/20 13:00	12/23/20 13:04	1
<b>Thorium-232</b>	<b>0.533</b>		0.244	0.250		0.150	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Thorium-234	-0.0860	U	0.923	0.923		0.762	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Uranium-235	0.0726	U	0.332	0.332		0.270	pCi/g	12/02/20 13:00	12/23/20 13:04	1
Uranium-238	-0.0860	U	0.923	0.923		0.762	pCi/g	12/02/20 13:00	12/23/20 13:04	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-010**  
Date Collected: 11/21/20 09:56  
Date Received: 11/27/20 09:12

**Lab Sample ID: 160-40588-10**  
Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.441		0.130	0.138		0.0224	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Actinium-227	0.0728	U	0.122	0.122		0.286	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Bismuth-212	-0.277	U	0.473	0.474		0.535	pCi/g	12/02/20 13:00	12/23/20 13:03	1
<b>Bismuth-214</b>	<b>0.264</b>		0.0976	0.101		0.0448	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Cesium-137	-0.00569	U	0.0599	0.0599	0.0700	0.0489	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Lead-210	-0.324	U	1.42	1.42		1.15	pCi/g	12/02/20 13:00	12/23/20 13:03	1
<b>Lead-212</b>	<b>0.340</b>		0.0712	0.0837		0.0343	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Lead-214	0.458		0.0938	0.105		0.0421	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Potassium-40	8.95		1.21	1.51		0.250	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Protactinium-231	0.527	U	1.55	1.55		1.70	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Protactinium-234	-0.00386	U	0.00875	0.00876		0.201	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Radium-226	0.264		0.0976	0.101	0.200	0.0448	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Radium-228	0.441		0.130	0.138		0.0224	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Thallium-208	0.124		0.0459	0.0477		0.0182	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Thorium 228	0.340		0.0712	0.0837		0.0343	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Thorium-232	0.441		0.130	0.138		0.0224	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Thorium-234	0.349	U	0.697	0.698		0.737	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Uranium-235	0.103	U	0.211	0.211		0.375	pCi/g	12/02/20 13:00	12/23/20 13:03	1
Uranium-238	0.349	U	0.697	0.698		0.737	pCi/g	12/02/20 13:00	12/23/20 13:03	1

**Client Sample ID: HPPG-ESU-TU108B-011**

**Lab Sample ID: 160-40588-11**

Date Collected: 11/21/20 10:14

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.164	J	0.147	0.147	0.331	0.107	pCi/g	12/03/20 11:35	12/14/20 17:08	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	102		40 - 110					12/03/20 11:35	12/14/20 17:08	1
Y Carrier	91.6		40 - 110					12/03/20 11:35	12/14/20 17:08	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.249		0.197	0.199		0.108	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Actinium-227	0.453		0.481	0.484		0.272	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Bismuth-212	-0.495	U	0.967	0.969		0.755	pCi/g	12/02/20 13:00	12/24/20 12:14	1
<b>Bismuth-214</b>	<b>0.355</b>		0.135	0.141		0.0565	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Cesium-137	-0.0198	U	0.0678	0.0679	0.0700	0.0540	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Lead-210	0.569	U	1.53	1.53		1.00	pCi/g	12/02/20 13:00	12/24/20 12:14	1
<b>Lead-212</b>	<b>0.370</b>		0.0998	0.109		0.0566	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Lead-214	0.377		0.118	0.126		0.0628	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Potassium-40	9.01		1.48	1.81		0.301	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Protactinium-231	-0.0908	U	2.83	2.83		2.32	pCi/g	12/02/20 13:00	12/24/20 12:14	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-011**

**Lab Sample ID: 160-40588-11**

Date Collected: 11/21/20 10:14

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0223	U	0.0548	0.0549		0.328	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Radium-226	0.355		0.135	0.141	0.200	0.0565	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Radium-228	0.249		0.197	0.199		0.108	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Thallium-208	0.171		0.0611	0.0642		0.0220	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Thorium 228	0.370		0.0998	0.109		0.0566	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Thorium-232	0.249		0.197	0.199		0.108	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Thorium-234	-0.726	U	0.617	0.623		0.886	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Uranium-235	-0.255	U	0.740	0.741		0.621	pCi/g	12/02/20 13:00	12/24/20 12:14	1
Uranium-238	-0.726	U	0.617	0.623		0.886	pCi/g	12/02/20 13:00	12/24/20 12:14	1

**Client Sample ID: HPPG-ESU-TU108B-012**

**Lab Sample ID: 160-40588-12**

Date Collected: 11/21/20 10:04

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.582		0.149	0.161		0.0301	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Actinium-227	0.0510	U	0.186	0.186		0.372	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Bismuth-212	0.000	U	0.546	0.546		0.606	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Bismuth-214	0.380		0.117	0.123		0.0500	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Cesium-137	-0.00404	U	0.0853	0.0853	0.0700	0.0700	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Lead-210	2.74		1.72	1.76		0.991	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Lead-212	0.407		0.0973	0.106		0.0531	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Lead-214	0.462		0.125	0.133		0.0546	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Potassium-40	9.47		1.38	1.68		0.117	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Protactinium-231	0.132	U	1.53	1.53		2.36	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Protactinium-234	0.0889	U	0.313	0.313		0.255	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Radium-226	0.380		0.117	0.123	0.200	0.0500	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Radium-228	0.582		0.149	0.161		0.0301	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Thallium-208	0.211		0.0706	0.0738		0.0220	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Thorium 228	0.407		0.0973	0.106		0.0531	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Thorium-232	0.582		0.149	0.161		0.0301	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Thorium-234	-0.544	U	0.635	0.638		0.875	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Uranium-235	0.249	U	0.337	0.338		0.361	pCi/g	12/02/20 13:00	12/23/20 13:33	1
Uranium-238	-0.544	U	0.635	0.638		0.875	pCi/g	12/02/20 13:00	12/23/20 13:33	1

**Client Sample ID: HPPG-ESU-TU108B-013**

**Lab Sample ID: 160-40588-13**

Date Collected: 11/21/20 10:07

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.139	U	0.251	0.251		0.153	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Actinium-227	-0.0798	U	0.702	0.702		0.356	pCi/g	12/02/20 14:03	12/23/20 08:48	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-013**

**Lab Sample ID: 160-40588-13**

Date Collected: 11/21/20 10:07

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	1.37		0.618	0.638		0.198	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Bismuth-214	0.488		0.130	0.142		0.0411	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Cesium-137	0.0281	U	0.0550	0.0551	0.0700	0.0418	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Lead-210	0.428	U	1.76	1.77		1.13	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Lead-212	0.470		0.107	0.121		0.0574	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Lead-214	0.429		0.128	0.137		0.0519	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Potassium-40	8.70		1.46	1.77		0.302	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Protactinium-231	0.724	U	1.91	1.91		2.09	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Protactinium-234	0.00752	U	0.0142	0.0142		0.297	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Radium-226	0.488		0.130	0.142	0.200	0.0411	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Radium-228	0.139	U	0.251	0.251		0.153	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Thallium-208	0.153		0.0618	0.0642		0.0262	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Thorium 228	0.470		0.107	0.121		0.0574	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Thorium-232	0.139	U	0.251	0.251		0.153	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Thorium-234	-0.543	U	0.941	0.943		0.947	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Uranium-235	0.134	U	0.480	0.480		0.495	pCi/g	12/02/20 14:03	12/23/20 08:48	1
Uranium-238	-0.543	U	0.941	0.943		0.947	pCi/g	12/02/20 14:03	12/23/20 08:48	1

**Client Sample ID: HPPG-ESU-TU108B-014**

**Lab Sample ID: 160-40588-14**

Date Collected: 11/21/20 10:18

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.462		0.132	0.140		0.0220	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Actinium-227	0.0572	U	0.118	0.119		0.272	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Bismuth-212	1.10		0.376	0.393		0.0710	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Bismuth-214	0.376		0.0917	0.0997		0.0338	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Cesium-137	0.0180	U	0.0441	0.0441	0.0700	0.0346	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Lead-210	0.0531	U	1.01	1.01		0.832	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Lead-212	0.468		0.0768	0.0978		0.0307	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Lead-214	0.299		0.0932	0.0982		0.0421	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Potassium-40	8.47		1.16	1.45		0.246	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Protactinium-231	0.293	U	1.13	1.13		1.77	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Protactinium-234	-0.0904	U	0.258	0.259		0.210	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Radium-226	0.376		0.0917	0.0997	0.200	0.0338	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Radium-228	0.462		0.132	0.140		0.0220	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Thallium-208	0.167		0.0464	0.0495		0.0153	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Thorium 228	0.468		0.0768	0.0978		0.0307	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Thorium-232	0.462		0.132	0.140		0.0220	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Thorium-234	0.000	U	0.381	0.381		0.738	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Uranium-235	-0.0294	U	0.0599	0.0599		0.179	pCi/g	12/02/20 14:03	12/23/20 09:15	1
Uranium-238	0.000	U	0.381	0.381		0.738	pCi/g	12/02/20 14:03	12/23/20 09:15	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-015**

**Lab Sample ID: 160-40588-15**

Matrix: Solid

Date Collected: 11/21/20 10:22  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.438		0.142	0.149		0.0782	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Actinium-227	0.210	U	0.326	0.327		0.239	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Bismuth-212	-0.177	U	0.621	0.622		0.498	pCi/g	12/02/20 14:03	12/23/20 09:16	1
<b>Bismuth-214</b>	<b>0.302</b>		0.0884	0.0938		0.0385	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Cesium-137	-0.00615	U	0.0501	0.0501	0.0700	0.0408	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Lead-210	0.500	U	0.915	0.917		0.724	pCi/g	12/02/20 14:03	12/23/20 09:16	1
<b>Lead-212</b>	<b>0.353</b>		0.0647	0.0792		0.0268	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Lead-214	0.330		0.0809	0.0878		0.0478	pCi/g	12/02/20 14:03	12/23/20 09:16	1
<b>Potassium-40</b>	<b>7.73</b>		1.03	1.30		0.0797	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Protactinium-231	0.0969	U	1.99	1.99		1.63	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Protactinium-234	0.0153	U	0.0620	0.0620		0.177	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Radium-226	0.302		0.0884	0.0938	0.200	0.0385	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Radium-228	0.438		0.142	0.149		0.0782	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Thallium-208	0.223		0.0435	0.0493		0.00494	pCi/g	12/02/20 14:03	12/23/20 09:16	1
<b>Thorium 228</b>	<b>0.353</b>		0.0647	0.0792		0.0268	pCi/g	12/02/20 14:03	12/23/20 09:16	1
<b>Thorium-232</b>	<b>0.438</b>		0.142	0.149		0.0782	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Thorium-234	0.165	U	0.349	0.350		0.597	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Uranium-235	0.0802	U	0.144	0.145		0.301	pCi/g	12/02/20 14:03	12/23/20 09:16	1
Uranium-238	0.165	U	0.349	0.350		0.597	pCi/g	12/02/20 14:03	12/23/20 09:16	1

**Client Sample ID: HPPG-ESU-TU108B-016**

**Lab Sample ID: 160-40588-16**

Matrix: Solid

Date Collected: 11/21/20 10:26  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.461		0.138	0.146		0.0270	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Actinium-227	0.187	U	0.326	0.327		0.284	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Bismuth-212	0.190	U	0.336	0.337		0.239	pCi/g	12/02/20 14:03	12/23/20 08:50	1
<b>Bismuth-214</b>	<b>0.363</b>		0.118	0.124		0.0533	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Cesium-137	0.0233	U	0.0527	0.0527	0.0700	0.0411	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Lead-210	-0.648	U	1.61	1.61		1.35	pCi/g	12/02/20 14:03	12/23/20 08:50	1
<b>Lead-212</b>	<b>0.332</b>		0.0816	0.0923		0.0426	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Lead-214	0.371		0.102	0.109		0.0443	pCi/g	12/02/20 14:03	12/23/20 08:50	1
<b>Potassium-40</b>	<b>8.36</b>		1.27	1.53		0.251	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Protactinium-231	0.000	U	0.331	0.331		2.03	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Protactinium-234	0.0686	U	0.106	0.107		0.228	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Radium-226	0.363		0.118	0.124	0.200	0.0533	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Radium-228	0.461		0.138	0.146		0.0270	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Thallium-208	0.183		0.0581	0.0611		0.0201	pCi/g	12/02/20 14:03	12/23/20 08:50	1
<b>Thorium 228</b>	<b>0.332</b>		0.0816	0.0923		0.0426	pCi/g	12/02/20 14:03	12/23/20 08:50	1
<b>Thorium-232</b>	<b>0.461</b>		0.138	0.146		0.0270	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Thorium-234	-0.437	U	0.908	0.909		0.758	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Uranium-235	-0.174	U	0.582	0.582		0.475	pCi/g	12/02/20 14:03	12/23/20 08:50	1
Uranium-238	-0.437	U	0.908	0.909		0.758	pCi/g	12/02/20 14:03	12/23/20 08:50	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-017**

**Lab Sample ID: 160-40588-17**

Date Collected: 11/21/20 10:28

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.134		0.159	0.160		0.133	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Actinium-227	0.164	U	0.317	0.318		0.261	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Bismuth-212	-0.324	U	0.926	0.927		0.737	pCi/g	12/02/20 14:03	12/23/20 08:49	1
<b>Bismuth-214</b>	<b>0.325</b>		0.105	0.110		0.0426	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Cesium-137	-0.0340	U	0.0724	0.0725	0.0700	0.0378	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Lead-210	-0.132	U		1.31		1.08	pCi/g	12/02/20 14:03	12/23/20 08:49	1
<b>Lead-212</b>	<b>0.219</b>		0.0796	0.0845		0.0482	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Lead-214	0.311		0.0900	0.0956		0.0371	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Potassium-40	6.42		1.27	1.43		0.251	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Protactinium-231	0.000	U	0.370	0.370		1.84	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Protactinium-234	0.0661	U	0.255	0.255		0.208	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Radium-226	0.325		0.105	0.110	0.200	0.0426	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Radium-228	0.134		0.159	0.160		0.133	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Thallium-208	0.114		0.0522	0.0535		0.0212	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Thorium 228	0.219		0.0796	0.0845		0.0482	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Thorium-232	0.134		0.159	0.160		0.133	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Thorium-234	-0.430	U	0.754	0.756		0.892	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Uranium-235	-0.00762	U	0.274	0.274		0.363	pCi/g	12/02/20 14:03	12/23/20 08:49	1
Uranium-238	-0.430	U	0.754	0.756		0.892	pCi/g	12/02/20 14:03	12/23/20 08:49	1

**Client Sample ID: HPPG-ESU-TU108B-018**

**Lab Sample ID: 160-40588-18**

Date Collected: 11/21/20 10:29

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.274		0.261	0.263		0.144	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Actinium-227	0.0237	U	0.512	0.512		0.317	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Bismuth-212	-0.327	U	0.799	0.800		0.714	pCi/g	12/02/20 14:03	12/23/20 08:51	1
<b>Bismuth-214</b>	<b>0.361</b>		0.133	0.138		0.0674	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Cesium-137	0.0275	U	0.0863	0.0863	0.0700	0.0687	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Lead-210	0.275	U	1.07	1.07		0.740	pCi/g	12/02/20 14:03	12/23/20 08:51	1
<b>Lead-212</b>	<b>0.354</b>		0.0880	0.0993		0.0420	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Lead-214	0.324		0.122	0.127		0.0622	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Potassium-40	9.07		1.59	1.84		0.262	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Protactinium-231	0.256	U	1.22	1.22		1.94	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Protactinium-234	-0.0887	U	0.229	0.229		0.185	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Radium-226	0.361		0.133	0.138	0.200	0.0674	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Radium-228	0.274		0.261	0.263		0.144	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Thallium-208	0.120		0.0737	0.0748		0.0346	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Thorium 228	0.354		0.0880	0.0993		0.0420	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Thorium-232	0.274		0.261	0.263		0.144	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Thorium-234	0.744		0.615	0.621		0.363	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Uranium-235	0.0173	U	0.277	0.277		0.227	pCi/g	12/02/20 14:03	12/23/20 08:51	1
Uranium-238	0.744		0.615	0.621		0.363	pCi/g	12/02/20 14:03	12/23/20 08:51	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-019**

**Lab Sample ID: 160-40588-19**

Date Collected: 11/21/20 10:31

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.408		0.249	0.252		0.165	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Actinium-227	0.0743	U	0.345	0.345		0.348	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Bismuth-212	-0.0281	U	0.715	0.716		0.587	pCi/g	12/02/20 14:03	12/23/20 09:18	1
<b>Bismuth-214</b>	<b>0.386</b>		0.136	0.141		0.0624	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Cesium-137	-0.0511	U	0.0839	0.0841	0.0700	0.0655	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Lead-210	0.844	U	1.50	1.50		1.18	pCi/g	12/02/20 14:03	12/23/20 09:18	1
<b>Lead-212</b>	<b>0.375</b>		0.0917	0.0997		0.0487	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Lead-214	0.356		0.107	0.113		0.0502	pCi/g	12/02/20 14:03	12/23/20 09:18	1
<b>Potassium-40</b>	<b>10.3</b>		1.44	1.78		0.117	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Protactinium-231	-0.898	U	2.96	2.96		2.41	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Protactinium-234	0.0730	U	0.234	0.234		0.220	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Radium-226	0.386		0.136	0.141	0.200	0.0624	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Radium-228	0.408		0.249	0.252		0.165	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Thallium-208	0.160		0.0453	0.0482		0.00747	pCi/g	12/02/20 14:03	12/23/20 09:18	1
<b>Thorium 228</b>	<b>0.375</b>		0.0917	0.0997		0.0487	pCi/g	12/02/20 14:03	12/23/20 09:18	1
<b>Thorium-232</b>	<b>0.408</b>		0.249	0.252		0.165	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Thorium-234	0.204	U	0.540	0.541		0.430	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Uranium-235	0.151	U	0.408	0.409		0.350	pCi/g	12/02/20 14:03	12/23/20 09:18	1
Uranium-238	0.204	U	0.540	0.541		0.430	pCi/g	12/02/20 14:03	12/23/20 09:18	1

**Client Sample ID: HPPG-ESU-TU108B-020**

**Lab Sample ID: 160-40588-20**

Date Collected: 11/21/20 10:34

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.308		0.163	0.167		0.182	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Actinium-227	0.223	U	0.501	0.502		0.425	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Bismuth-212	0.0255	U	0.772	0.772		0.633	pCi/g	12/02/20 14:03	12/23/20 09:19	1
<b>Bismuth-214</b>	<b>0.451</b>		0.143	0.152		0.0556	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Cesium-137	-0.0425	U	0.0858	0.0860	0.0700	0.0672	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Lead-210	-0.986	U	1.96	1.97		1.65	pCi/g	12/02/20 14:03	12/23/20 09:19	1
<b>Lead-212</b>	<b>0.378</b>		0.0949	0.105		0.0471	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Lead-214	0.590		0.156	0.170		0.0765	pCi/g	12/02/20 14:03	12/23/20 09:19	1
<b>Potassium-40</b>	<b>9.66</b>		1.59	1.94		0.322	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Protactinium-231	0.943	U	3.22	3.22		2.62	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Protactinium-234	0.153	U	0.0790	0.0810		0.299	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Radium-226	0.451		0.143	0.152	0.200	0.0556	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Radium-228	0.308		0.163	0.167		0.182	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Thallium-208	0.0961		0.106	0.106		0.0527	pCi/g	12/02/20 14:03	12/23/20 09:19	1
<b>Thorium 228</b>	<b>0.378</b>		0.0949	0.105		0.0471	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Thorium-232	0.308		0.163	0.167		0.182	pCi/g	12/02/20 14:03	12/23/20 09:19	1
<b>Thorium-234</b>	<b>0.624</b>		0.632	0.637		0.481	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Uranium-235	0.0943	U	0.201	0.201		0.509	pCi/g	12/02/20 14:03	12/23/20 09:19	1
Uranium-238	0.624		0.632	0.637		0.481	pCi/g	12/02/20 14:03	12/23/20 09:19	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-021**

**Lab Sample ID: 160-40588-21**

Date Collected: 11/21/20 10:35

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.138	J	0.172	0.172	0.331	0.131	pCi/g	12/03/20 11:35	12/14/20 17:09	1
<i>Carrier</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	102		40 - 110					12/03/20 11:35	12/14/20 17:09	1
Y Carrier	87.9		40 - 110					12/03/20 11:35	12/14/20 17:09	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.646		0.181	0.192		0.0462	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Actinium-227	-0.0177	U	0.0718	0.0718		0.292	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Bismuth-212	0.284	U	0.595	0.596		0.466	pCi/g	12/02/20 14:03	12/23/20 09:58	1
<b>Bismuth-214</b>	<b>0.155</b>		0.0820	0.0835		0.108	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Cesium-137	-0.0395	U	0.0651	0.0652	0.0700	0.0511	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Lead-210	0.0862	U	1.12	1.12		0.914	pCi/g	12/02/20 14:03	12/23/20 09:58	1
<b>Lead-212</b>	<b>0.431</b>		0.0750	0.0935		0.0329	pCi/g	12/02/20 14:03	12/23/20 09:58	1
<b>Lead-214</b>	<b>0.400</b>		0.0930	0.102		0.0490	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Potassium-40	8.71		1.16	1.47		0.240	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Protactinium-231	0.000	U	0.350	0.350		1.72	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Protactinium-234	0.0212	U	0.101	0.101		0.185	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Radium-226	0.155		0.0820	0.0835	0.200	0.108	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Radium-228	0.646		0.181	0.192		0.0462	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Thallium-208	0.0492		0.0331	0.0335		0.0372	pCi/g	12/02/20 14:03	12/23/20 09:58	1
<b>Thorium 228</b>	<b>0.431</b>		0.0750	0.0935		0.0329	pCi/g	12/02/20 14:03	12/23/20 09:58	1
<b>Thorium-232</b>	<b>0.646</b>		0.181	0.192		0.0462	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Thorium-234	-0.300	U	1.03	1.03		0.842	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Uranium-235	-0.142	U	0.357	0.357		0.289	pCi/g	12/02/20 14:03	12/23/20 09:58	1
Uranium-238	-0.300	U	1.03	1.03		0.842	pCi/g	12/02/20 14:03	12/23/20 09:58	1

**Client Sample ID: HPPG-ESU-TU108B-022**

**Lab Sample ID: 160-40588-22**

Date Collected: 11/21/20 10:39

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.460		0.118	0.127		0.0490	pCi/g	12/02/20 14:03	12/23/20 09:59	1
Actinium-227	0.0907	U	0.196	0.196		0.287	pCi/g	12/02/20 14:03	12/23/20 09:59	1
Bismuth-212	0.384	U	0.784	0.785		0.621	pCi/g	12/02/20 14:03	12/23/20 09:59	1
<b>Bismuth-214</b>	<b>0.433</b>		0.109	0.118		0.0398	pCi/g	12/02/20 14:03	12/23/20 09:59	1
Cesium-137	0.0159	U	0.0374	0.0374	0.0700	0.0290	pCi/g	12/02/20 14:03	12/23/20 09:59	1
Lead-210	-0.668	U	1.50	1.50		1.21	pCi/g	12/02/20 14:03	12/23/20 09:59	1
<b>Lead-212</b>	<b>0.362</b>		0.0683	0.0828		0.0285	pCi/g	12/02/20 14:03	12/23/20 09:59	1
<b>Lead-214</b>	<b>0.318</b>		0.0791	0.0857		0.0443	pCi/g	12/02/20 14:03	12/23/20 09:59	1
Potassium-40	8.16		1.34	1.58		0.367	pCi/g	12/02/20 14:03	12/23/20 09:59	1
Protactinium-231	-0.589	U	2.24	2.24		1.82	pCi/g	12/02/20 14:03	12/23/20 09:59	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-022**

**Lab Sample ID: 160-40588-22**

Date Collected: 11/21/20 10:39

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Protactinium-234	0.0405	U		0.0784	0.0785		0.190	pCi/g	12/02/20 14:03	12/23/20 09:59
Radium-226	0.433			0.109	0.118	0.200	0.0398	pCi/g	12/02/20 14:03	12/23/20 09:59
Radium-228	0.460			0.118	0.127		0.0490	pCi/g	12/02/20 14:03	12/23/20 09:59
Thallium-208	0.127			0.0684	0.0697		0.0283	pCi/g	12/02/20 14:03	12/23/20 09:59
Thorium 228	0.362			0.0683	0.0828		0.0285	pCi/g	12/02/20 14:03	12/23/20 09:59
Thorium-232	0.460			0.118	0.127		0.0490	pCi/g	12/02/20 14:03	12/23/20 09:59
Thorium-234	-0.316	U		1.04	1.04		0.850	pCi/g	12/02/20 14:03	12/23/20 09:59
Uranium-235	0.0657	U		0.123	0.124		0.323	pCi/g	12/02/20 14:03	12/23/20 09:59
Uranium-238	-0.316	U		1.04	1.04		0.850	pCi/g	12/02/20 14:03	12/23/20 09:59

**Client Sample ID: HPPG-ESU-TU108B-023**

**Lab Sample ID: 160-40588-23**

Date Collected: 11/21/20 10:42

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.491			0.181	0.188		0.104	pCi/g	12/02/20 14:03	12/23/20 09:29
Actinium-227	0.185	U		0.525	0.526		0.318	pCi/g	12/02/20 14:03	12/23/20 09:29
Bismuth-212	0.239	U		0.728	0.728		0.578	pCi/g	12/02/20 14:03	12/23/20 09:29
Bismuth-214	0.444			0.122	0.131		0.0476	pCi/g	12/02/20 14:03	12/23/20 09:29
Cesium-137	0.00107	U		0.0605	0.0605	0.0700	0.0498	pCi/g	12/02/20 14:03	12/23/20 09:29
Lead-210	1.08			1.25	1.26		0.814	pCi/g	12/02/20 14:03	12/23/20 09:29
Lead-212	0.391			0.0848	0.0987		0.0399	pCi/g	12/02/20 14:03	12/23/20 09:29
Lead-214	0.368			0.125	0.130		0.0564	pCi/g	12/02/20 14:03	12/23/20 09:29
Potassium-40	8.86			1.33	1.61		0.259	pCi/g	12/02/20 14:03	12/23/20 09:29
Protactinium-231	0.351	U		1.43	1.43		2.23	pCi/g	12/02/20 14:03	12/23/20 09:29
Protactinium-234	0.00705	U		0.0105	0.0105		0.238	pCi/g	12/02/20 14:03	12/23/20 09:29
Radium-226	0.444			0.122	0.131	0.200	0.0476	pCi/g	12/02/20 14:03	12/23/20 09:29
Radium-228	0.491			0.181	0.188		0.104	pCi/g	12/02/20 14:03	12/23/20 09:29
Thallium-208	0.180			0.0500	0.0534		0.0147	pCi/g	12/02/20 14:03	12/23/20 09:29
Thorium 228	0.391			0.0848	0.0987		0.0399	pCi/g	12/02/20 14:03	12/23/20 09:29
Thorium-232	0.491			0.181	0.188		0.104	pCi/g	12/02/20 14:03	12/23/20 09:29
Thorium-234	0.471			0.401	0.405		0.470	pCi/g	12/02/20 14:03	12/23/20 09:29
Uranium-235	0.119	U		0.324	0.324		0.261	pCi/g	12/02/20 14:03	12/23/20 09:29
Uranium-238	0.471			0.401	0.405		0.470	pCi/g	12/02/20 14:03	12/23/20 09:29

**Client Sample ID: HPPG-ESU-TU108B-024**

**Lab Sample ID: 160-40588-24**

Date Collected: 11/21/20 10:46

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Actinium 228	0.403			0.165	0.170		0.0367	pCi/g	12/02/20 14:03	12/23/20 09:29
Actinium-227	0.122	U		0.419	0.419		0.356	pCi/g	12/02/20 14:03	12/23/20 09:29

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-ESU-TU108B-024**

**Lab Sample ID: 160-40588-24**

Date Collected: 11/21/20 10:46

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.278	U	0.501	0.501		0.365	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Bismuth-214</b>	<b>0.497</b>		0.188	0.195		0.0772	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Cesium-137	-0.0542	U	0.0838	0.0840	0.0700	0.0646	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Lead-210	0.910	U	1.72	1.72		1.08	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Lead-212</b>	<b>0.376</b>		0.104	0.115		0.0610	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Lead-214</b>	<b>0.511</b>		0.121	0.132		0.0410	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Potassium-40	8.33		1.50	1.72		0.273	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Protactinium-231	0.000	U	0.476	0.476		2.41	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Protactinium-234	0.112	U	0.297	0.298		0.241	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Radium-226</b>	<b>0.497</b>		0.188	0.195	0.200	0.0772	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Radium-228</b>	<b>0.403</b>		0.165	0.170		0.0367	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Thallium-208	0.154		0.0814	0.0830		0.0362	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Thorium 228</b>	<b>0.376</b>		0.104	0.115		0.0610	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Thorium-232</b>	<b>0.403</b>		0.165	0.170		0.0367	pCi/g	12/02/20 14:03	12/23/20 09:29	1
<b>Thorium-234</b>	<b>1.04</b>		0.585	0.596		0.373	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Uranium-235	0.151	U	0.326	0.326		0.437	pCi/g	12/02/20 14:03	12/23/20 09:29	1
Uranium-238	1.04		0.585	0.596		0.373	pCi/g	12/02/20 14:03	12/23/20 09:29	1

**Client Sample ID: HPPG-ESU-TU108B-025**

**Lab Sample ID: 160-40588-25**

Date Collected: 11/21/20 10:48

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.357</b>		0.226	0.229		0.0884	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Actinium-227	0.109	U	0.331	0.331		0.390	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Bismuth-212	-0.377	U	0.856	0.857		0.820	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Bismuth-214</b>	<b>0.313</b>		0.154	0.157		0.0861	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Cesium-137	0.0120	U	0.0691	0.0691	0.0700	0.0554	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Lead-210	-0.0173	U	1.61	1.61		1.14	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Lead-212</b>	<b>0.488</b>		0.106	0.123		0.0502	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Lead-214</b>	<b>0.384</b>		0.138	0.144		0.0703	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Potassium-40	11.3		1.82	2.16		0.279	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Protactinium-231	0.511	U	1.71	1.71		1.80	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Protactinium-234	0.167		0.219	0.220		0.159	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Radium-226</b>	<b>0.313</b>		0.154	0.157	0.200	0.0861	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Radium-228</b>	<b>0.357</b>		0.226	0.229		0.0884	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Thallium-208	0.110		0.0865	0.0872		0.0459	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Thorium 228</b>	<b>0.488</b>		0.106	0.123		0.0502	pCi/g	12/02/20 14:03	12/23/20 09:24	1
<b>Thorium-232</b>	<b>0.357</b>		0.226	0.229		0.0884	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Thorium-234	-0.0405	U	1.00	1.00		0.827	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Uranium-235	-0.180	U	0.536	0.536		0.360	pCi/g	12/02/20 14:03	12/23/20 09:24	1
Uranium-238	-0.0405	U	1.00	1.00		0.827	pCi/g	12/02/20 14:03	12/23/20 09:24	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-F-041**  
Date Collected: 11/21/20 10:14  
Date Received: 11/27/20 09:12

**Lab Sample ID: 160-40588-26**  
Matrix: Solid

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.239	U J	0.140	0.142	0.331	0.136	pCi/g	12/03/20 11:35	12/14/20 17:09	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	91.0		40 - 110					12/03/20 11:35	12/14/20 17:09	1
Y Carrier	90.1		40 - 110					12/03/20 11:35	12/14/20 17:09	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.457		0.150	0.157		0.0288	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Actinium-227	0.0930	U	0.481	0.481		0.295	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Bismuth-212	-0.256	U	0.761	0.762		0.604	pCi/g	12/02/20 14:03	12/23/20 10:02	1
<b>Bismuth-214</b>	<b>0.369</b>		0.130	0.135		0.0635	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Cesium-137	0.0300	U	0.0495	0.0496	0.0700	0.0373	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Lead-210	1.08		1.53	1.54		0.971	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Lead-212	0.430		0.0911	0.101		0.0447	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Lead-214	0.347		0.115	0.120		0.0551	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Potassium-40	10.1		1.39	1.72		0.112	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Protactinium-231	-0.887	U	2.94	2.94		2.39	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Protactinium-234	0.0212	U	0.0388	0.0388		0.236	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Radium-226	0.369		0.130	0.135	0.200	0.0635	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Radium-228	0.457		0.150	0.157		0.0288	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thallium-208	0.162		0.0641	0.0662		0.0248	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium 228	0.430		0.0911	0.101		0.0447	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium-232	0.457		0.150	0.157		0.0288	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium-234	0.419	U	0.550	0.552		0.427	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Uranium-235	0.141	U	0.370	0.370		0.299	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Uranium-238	0.419	U	0.550	0.552		0.427	pCi/g	12/02/20 14:03	12/23/20 10:02	1

**Client Sample ID: HPPG-F-042**

**Lab Sample ID: 160-40588-27**

Date Collected: 11/21/20 10:26

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.494		0.243	0.250		0.0945	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Actinium-227	0.140	U	0.294	0.295		0.437	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Bismuth-212	0.349	U	0.968	0.969		0.765	pCi/g	12/02/20 14:03	12/23/20 10:01	1
<b>Bismuth-214</b>	<b>0.443</b>		0.171	0.178		0.0747	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Cesium-137	-0.0108	U	0.0967	0.0967	0.0700	0.0788	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Lead-210	-0.922	U	2.22	2.22		1.86	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Lead-212	0.487		0.112	0.125		0.0574	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Lead-214	0.457		0.135	0.145		0.0812	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Potassium-40	10.5		1.68	2.06		0.332	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Protactinium-231	0.000	U	0.483	0.483		2.66	pCi/g	12/02/20 14:03	12/23/20 10:01	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Client Sample ID: HPPG-F-042**

**Lab Sample ID: 160-40588-27**

Date Collected: 11/21/20 10:26

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Protactinium-234	-0.0431	U	0.131	0.131		0.305	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Radium-226	0.443		0.171	0.178	0.200	0.0747	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Radium-228	0.494		0.243	0.250		0.0945	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Thallium-208	0.266		0.0811	0.0867		0.0275	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Thorium 228	0.487		0.112	0.125		0.0574	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Thorium-232	0.494		0.243	0.250		0.0945	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Thorium-234	0.229	U	0.287	0.289		0.679	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Uranium-235	0.0267	U	0.0577	0.0578		0.363	pCi/g	12/02/20 14:03	12/23/20 10:01	1
Uranium-238	0.229	U	0.287	0.289		0.679	pCi/g	12/02/20 14:03	12/23/20 10:01	1

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# QC Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40588-1  
 SDG: GJ46599767

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID:** MB 160-490804/22-A

**Matrix:** Solid

**Analysis Batch:** 491746

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490804

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.1449		0.155	0.156	0.331	0.117	pCi/g	12/03/20 11:35	12/14/20 17:12	1
<b>Carrier</b>										
<i>Sr Carrier</i> 102										
<i>Y Carrier</i> 92.7										

**Lab Sample ID:** LCS 160-490804/1-A

**Matrix:** Solid

**Analysis Batch:** 491659

**Client Sample ID:** Lab Control Sample

**Prep Type:** Total/NA

**Prep Batch:** 490804

Analyte	MB	MB	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	Limits
	Result	Qualifier									
Strontium-90	7.76		7.76	5.722	J	0.669	0.331	0.147	pCi/g	74	75 - 125
<b>Carrier</b>											
<i>Sr Carrier</i> 80.9											
<i>Y Carrier</i> 93.8											

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID:** MB 160-490763/1-A

**Matrix:** Solid

**Analysis Batch:** 492822

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490763

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Actinium 228	0.07010	U	0.254	0.254		0.129	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Actinium-227	0.5179		0.315	0.320		0.126	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Bismuth-212	0.3813	U	1.29	1.29		1.04	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Bismuth-214	-0.1916	U	0.154	0.155		0.259	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Cesium-137	-0.06487	U	0.105	0.105	0.0700	0.0813	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Lead-210	1.436		1.58	1.59		1.07	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Lead-212	0.01717	U	0.0714	0.0715		0.0561	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Lead-214	-0.06362	U	0.106	0.106		0.0927	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Potassium-40	0.1359	U	0.827	0.827		0.388	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Protactinium-231	0.0000002	U	3.48	3.48		2.87	pCi/g	12/02/20 13:00	12/23/20 11:24	1
	962									
Protactinium-234	0.07170	U	0.187	0.187		0.149	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Radium-226	-0.1916	U	0.154	0.155	0.200	0.259	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Radium-228	0.07010	U	0.254	0.254		0.129	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Thallium-208	0.06245		0.0472	0.0476		0.0298	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Thorium 228	0.01717	U	0.0714	0.0715		0.0561	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Thorium-232	0.07010	U	0.254	0.254		0.129	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Thorium-234	-0.5137	U	0.803	0.805		0.683	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Uranium-235	0.1402	U	0.291	0.292		0.328	pCi/g	12/02/20 13:00	12/23/20 11:24	1
Uranium-238	-0.5137	U	0.803	0.805		0.683	pCi/g	12/02/20 13:00	12/23/20 11:24	1

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** LCS 160-490763/2-A  
**Matrix:** Solid  
**Analysis Batch:** 492825

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 490763

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec.	Limits
		Result	Qual		LOQ	DLC		
Americium-241	96.4	95.04		10.0		0.644	pCi/g	99 87 - 116
Cesium-137	26.7	27.04		2.91	0.0700	0.0870	pCi/g	101 87 - 120
Cobalt-60	9.43	9.520		1.03		0.0417	pCi/g	101 87 - 115

**Lab Sample ID:** 160-40588-12 DU  
**Matrix:** Solid  
**Analysis Batch:** 492824

**Client Sample ID:** HPPG-ESU-TU108B-012  
**Prep Type:** Total/NA  
**Prep Batch:** 490763

Analyte	Sample	Sample	DU		Uncert. (2σ+/-)	Total		RER	Limit
	Result	Qual	Result	Qual		LOQ	DLC	Unit	
Actinium 228	0.582		0.3873		0.128		0.0215	pCi/g	0.68 1
Actinium-227	0.0510	U	0.1127	U	0.267		0.267	pCi/g	0.14 1
Bismuth-212	0.000	U	0.1385	U	0.461		0.364	pCi/g	0.14 1
Bismuth-214	0.380		0.3364		0.113		0.0474	pCi/g	0.18 1
Cesium-137	-0.00404	U	0.006652	U	0.0398	0.0700	0.0321	pCi/g	0.09 1
Lead-210	2.74		0.5207	U	1.09		0.871	pCi/g	0.78 1
Lead-212	0.407		0.3932		0.0880		0.0314	pCi/g	0.07 1
Lead-214	0.462		0.3703		0.0971		0.0439	pCi/g	0.40 1
Potassium-40	9.47		8.258		1.42		0.241	pCi/g	0.39 1
Protactinium-231	0.132	U	0.0000	U	0.485		1.70	pCi/g	0.07 1
Protactinium-234	0.0889	U	0.03919	U	0.0891		0.193	pCi/g	0.12 1
Radium-226	0.380		0.3364		0.113	0.200	0.0474	pCi/g	0.18 1
Radium-228	0.582		0.3873		0.128		0.0215	pCi/g	0.68 1
Thallium-208	0.211		0.1468		0.0477		0.0168	pCi/g	0.53 1
Thorium 228	0.407		0.3932		0.0880		0.0314	pCi/g	0.07 1
Thorium-232	0.582		0.3873		0.128		0.0215	pCi/g	0.68 1
Thorium-234	-0.544	U	0.1974	U	0.428		0.858	pCi/g	0.70 1
Uranium-235	0.249	U	0.0000	U	0.140		0.309	pCi/g	0.52 1
Uranium-238	-0.544	U	0.1974	U	0.428		0.858	pCi/g	0.70 1

**Lab Sample ID:** MB 160-490768/1-A  
**Matrix:** Solid  
**Analysis Batch:** 492829

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 490768

Analyte	MB	MB	Count	Total		Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit	
Actinium 228	-0.03808	U	0.0956	0.0957		0.137	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Actinium-227	0.08637	U	0.222	0.222		0.306	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Bismuth-212	0.3625	U	0.680	0.681		0.513	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Bismuth-214	-0.01490	U	0.0268	0.0268		0.158	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Cesium-137	-0.01957	U	0.0651	0.0651	0.0700	0.0357	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Lead-210	0.2513	U	1.22	1.22		0.879	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Lead-212	-0.007941	U	0.0847	0.0847		0.0698	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Lead-214	-0.01332	U	0.0954	0.0954		0.0787	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Potassium-40	0.4500		0.537	0.539		0.339	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Protactinium-231	0.7858	U	0.759	0.763		2.03	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Protactinium-234	-0.09659	U	0.216	0.216		0.242	pCi/g	12/02/20 14:03 12/23/20 08:18 1
Radium-226	-0.01490	U	0.0268	0.0268	0.200	0.158	pCi/g	12/02/20 14:03 12/23/20 08:18 1

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# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40588-1  
SDG: GJ46599767

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-490768/1-A

Matrix: Solid

Analysis Batch: 492829

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490768

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Radium-228	-0.03808	U		0.0956		0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thallium-208	0.03546			0.0510		0.0511		0.0192	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thorium 228	-0.007941	U		0.0847		0.0847		0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thorium-232	-0.03808	U		0.0956		0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thorium-234	0.1218	U		0.618		0.618		0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Uranium-235	0.1931	U		0.260		0.261		0.218	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Uranium-238	0.1218	U		0.618		0.618		0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1

Lab Sample ID: LCS 160-490768/2-A

Matrix: Solid

Analysis Batch: 492822

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 490768

Analyte	Spike Added	LCS Result	LCS Qual	Total				%Rec.	Limits	
				Uncert.	(2σ+/-)	LOQ	DLC			
Americium-241	96.4	97.41		11.5			0.632	pCi/g	101	87 - 116
Cesium-137	26.7	29.43		3.09		0.0700	0.111	pCi/g	110	87 - 120
Cobalt-60	9.43	9.871		1.04			0.0464	pCi/g	105	87 - 115

Eurofins TestAmerica, St. Louis

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Rad**

**Leach Batch: 490564**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40588-1	HPPG-ESU-TU108B-001	Total/NA	Solid	Dry and Grind	
160-40588-2	HPPG-ESU-TU108B-002	Total/NA	Solid	Dry and Grind	
160-40588-3	HPPG-ESU-TU108B-003	Total/NA	Solid	Dry and Grind	
160-40588-4	HPPG-ESU-TU108B-004	Total/NA	Solid	Dry and Grind	
160-40588-5	HPPG-ESU-TU108B-005	Total/NA	Solid	Dry and Grind	
160-40588-6	HPPG-ESU-TU108B-006	Total/NA	Solid	Dry and Grind	
160-40588-7	HPPG-ESU-TU108B-007	Total/NA	Solid	Dry and Grind	
160-40588-8	HPPG-ESU-TU108B-008	Total/NA	Solid	Dry and Grind	
160-40588-9	HPPG-ESU-TU108B-009	Total/NA	Solid	Dry and Grind	
160-40588-10	HPPG-ESU-TU108B-010	Total/NA	Solid	Dry and Grind	
160-40588-11	HPPG-ESU-TU108B-011	Total/NA	Solid	Dry and Grind	
160-40588-12	HPPG-ESU-TU108B-012	Total/NA	Solid	Dry and Grind	
160-40588-12 DU	HPPG-ESU-TU108B-012	Total/NA	Solid	Dry and Grind	

**Leach Batch: 490566**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40588-13	HPPG-ESU-TU108B-013	Total/NA	Solid	Dry and Grind	
160-40588-14	HPPG-ESU-TU108B-014	Total/NA	Solid	Dry and Grind	
160-40588-15	HPPG-ESU-TU108B-015	Total/NA	Solid	Dry and Grind	
160-40588-16	HPPG-ESU-TU108B-016	Total/NA	Solid	Dry and Grind	
160-40588-17	HPPG-ESU-TU108B-017	Total/NA	Solid	Dry and Grind	
160-40588-18	HPPG-ESU-TU108B-018	Total/NA	Solid	Dry and Grind	
160-40588-19	HPPG-ESU-TU108B-019	Total/NA	Solid	Dry and Grind	
160-40588-20	HPPG-ESU-TU108B-020	Total/NA	Solid	Dry and Grind	
160-40588-21	HPPG-ESU-TU108B-021	Total/NA	Solid	Dry and Grind	
160-40588-22	HPPG-ESU-TU108B-022	Total/NA	Solid	Dry and Grind	
160-40588-23	HPPG-ESU-TU108B-023	Total/NA	Solid	Dry and Grind	
160-40588-24	HPPG-ESU-TU108B-024	Total/NA	Solid	Dry and Grind	
160-40588-25	HPPG-ESU-TU108B-025	Total/NA	Solid	Dry and Grind	
160-40588-26	HPPG-F-041	Total/NA	Solid	Dry and Grind	
160-40588-27	HPPG-F-042	Total/NA	Solid	Dry and Grind	

**Prep Batch: 490763**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40588-1	HPPG-ESU-TU108B-001	Total/NA	Solid	Fill_Geo-21	490564
160-40588-2	HPPG-ESU-TU108B-002	Total/NA	Solid	Fill_Geo-21	490564
160-40588-3	HPPG-ESU-TU108B-003	Total/NA	Solid	Fill_Geo-21	490564
160-40588-4	HPPG-ESU-TU108B-004	Total/NA	Solid	Fill_Geo-21	490564
160-40588-5	HPPG-ESU-TU108B-005	Total/NA	Solid	Fill_Geo-21	490564
160-40588-6	HPPG-ESU-TU108B-006	Total/NA	Solid	Fill_Geo-21	490564
160-40588-7	HPPG-ESU-TU108B-007	Total/NA	Solid	Fill_Geo-21	490564
160-40588-8	HPPG-ESU-TU108B-008	Total/NA	Solid	Fill_Geo-21	490564
160-40588-9	HPPG-ESU-TU108B-009	Total/NA	Solid	Fill_Geo-21	490564
160-40588-10	HPPG-ESU-TU108B-010	Total/NA	Solid	Fill_Geo-21	490564
160-40588-11	HPPG-ESU-TU108B-011	Total/NA	Solid	Fill_Geo-21	490564
160-40588-12	HPPG-ESU-TU108B-012	Total/NA	Solid	Fill_Geo-21	490564
MB 160-490763/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490763/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40588-12 DU	HPPG-ESU-TU108B-012	Total/NA	Solid	Fill_Geo-21	490564

Eurofins TestAmerica, St. Louis

# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40588-1  
SDG: GJ46599767

Rad

Prep Batch: 490768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40588-13	HPPG-ESU-TU108B-013	Total/NA	Solid	Fill_Geo-21	490566
160-40588-14	HPPG-ESU-TU108B-014	Total/NA	Solid	Fill_Geo-21	490566
160-40588-15	HPPG-ESU-TU108B-015	Total/NA	Solid	Fill_Geo-21	490566
160-40588-16	HPPG-ESU-TU108B-016	Total/NA	Solid	Fill_Geo-21	490566
160-40588-17	HPPG-ESU-TU108B-017	Total/NA	Solid	Fill_Geo-21	490566
160-40588-18	HPPG-ESU-TU108B-018	Total/NA	Solid	Fill_Geo-21	490566
160-40588-19	HPPG-ESU-TU108B-019	Total/NA	Solid	Fill_Geo-21	490566
160-40588-20	HPPG-ESU-TU108B-020	Total/NA	Solid	Fill_Geo-21	490566
160-40588-21	HPPG-ESU-TU108B-021	Total/NA	Solid	Fill_Geo-21	490566
160-40588-22	HPPG-ESU-TU108B-022	Total/NA	Solid	Fill_Geo-21	490566
160-40588-23	HPPG-ESU-TU108B-023	Total/NA	Solid	Fill_Geo-21	490566
160-40588-24	HPPG-ESU-TU108B-024	Total/NA	Solid	Fill_Geo-21	490566
160-40588-25	HPPG-ESU-TU108B-025	Total/NA	Solid	Fill_Geo-21	490566
160-40588-26	HPPG-F-041	Total/NA	Solid	Fill_Geo-21	490566
160-40588-27	HPPG-F-042	Total/NA	Solid	Fill_Geo-21	490566
MB 160-490768/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490768/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40588-1	HPPG-ESU-TU108B-001	Total/NA	Solid	DPS-7	490564
160-40588-11	HPPG-ESU-TU108B-011	Total/NA	Solid	DPS-7	490564
160-40588-21	HPPG-ESU-TU108B-021	Total/NA	Solid	DPS-7	490566
160-40588-26	HPPG-F-041	Total/NA	Solid	DPS-7	490566
MB 160-490804/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490804/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Eurofins TestAmerica, St. Louis

# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40588-1  
SDG: GJ46599767

**Method: 905 - Strontium-90 (GFPC)**

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40588-1	HPPG-ESU-TU108B-001	98.0	91.6
160-40588-11	HPPG-ESU-TU108B-011	102	91.6
160-40588-21	HPPG-ESU-TU108B-021	102	87.9
160-40588-26	HPPG-F-041	91.0	90.1
LCS 160-490804/1-A	Lab Control Sample	80.9	93.8
MB 160-490804/22-A	Method Blank	102	92.7

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier

Eurofins TestAmerica, St. Louis



## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40589-1  
Laboratory Sample Delivery Group: D1189453  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
4/12/2021 4:08:36 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

#### LINKS

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40589-1  
SDG: D1189453

**Job ID: 160-40589-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40589-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40589-1  
SDG: D1189453

## Job ID: 160-40589-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/27/2020; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 14.7 C.

#### STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU108B-B-001 (160-40589-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/30/2020, prepared on 12/03/2020 and analyzed on 12/14/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU108B-B-001 (160-40589-1).

The strontium carrier recovery is outside the lower control limit (40%) for the sample duplicate in batch 160-490804: (160-39992-A-30-D DU). The detection goal was not met for these samples due to the low carrier recovery from the presence of matrix interference apparent during the initial preparation of the sample. The QC associated with these samples fell within acceptable criteria demonstrating acceptable preparation and instrument performance. The data have been reported with this narrative.

The laboratory control sample (LCS) associated with the following sample in batch 160-490804 falls below the lower limit for spike criteria (recovery is 74%; criteria is 75-125%): HPPG-ESU-TU108B-B-001 (160-40589-1). The other QC associated with this batch (MB, RER for duplicate precision, carrier recoveries associated) fall within acceptable criteria demonstrating acceptable preparation and instrument performance. The LCS recovery is within statistical limits of 59-124%. The data have been reported with this narrative by client approval.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490804/22-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU108B-B-001 (160-40589-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/30/2020, prepared on 12/02/2020 and analyzed on 12/23/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

#### Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40589-1  
SDG: D1189453

### Job ID: 160-40589-1 (Continued)

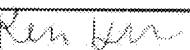
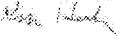
#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490768/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



## All Transfers for COC 501197RSY-042

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/23/2020 17:08	Locked Storage(Kevin Hoch)		11/23/2020 17:08
Locked Storage(Kevin Hoch)		11/25/2020 07:37	Devin Lewis		11/25/2020 07:37
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB	 MICHA KORRINHTZER	11/27/2020 09:12

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40589-1  
SDG Number: D1189453**Login Number: 40589****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Greer, Diane A**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40589-1  
SDG: D1189453

## Qualifiers

Rad Qualifier	Qualifier Description
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

## Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40589-1  
SDG: D1189453

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

### Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

### Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40589-1  
SDG: D1189453

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40589-1	HPPG-ESU-TU108B-B-001	Solid	11/23/20 16:28	11/27/20 09:12	

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40589-1  
SDG: D1189453

**Client Sample ID: HPPG-ESU-TU108B-B-001**

**Lab Sample ID: 160-40589-1**

Date Collected: 11/23/20 16:28

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.112	U J	0.112	0.113	0.331	0.104	pCi/g	12/03/20 11:35	12/14/20 17:09	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	91.0		40 - 110					12/03/20 11:35	12/14/20 17:09	1
Y Carrier	89.7		40 - 110					12/03/20 11:35	12/14/20 17:09	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.159	U	0.301	0.301		0.167	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Actinium-227	0.0140	U	0.0311	0.0311		0.390	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Bismuth-212	0.626	U	1.19	1.19		0.937	pCi/g	12/02/20 14:03	12/23/20 10:18	1
<b>Bismuth-214</b>	<b>0.188</b>		0.112	0.114		0.107	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Cesium-137	-0.0546	U	0.0821	0.0823	0.0700	0.0631	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Lead-210	0.852		0.993	0.998		0.664	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Lead-212	0.307		0.0989	0.107		0.0602	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Lead-214	0.347		0.111	0.117		0.0744	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Potassium-40	9.09		1.57	1.82		0.275	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Protactinium-231	-1.06	U	3.18	3.19		2.59	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Protactinium-234	0.0536	U	0.256	0.256		0.194	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Radium-226	0.188		0.112	0.114	0.200	0.107	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Radium-228	0.159	U	0.301	0.301		0.167	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Thallium-208	0.0546		0.0920	0.0921		0.0486	pCi/g	12/02/20 14:03	12/23/20 10:18	1
<b>Thorium 228</b>	<b>0.307</b>		0.0989	0.107		0.0602	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Thorium-232	0.159	U	0.301	0.301		0.167	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Thorium-234	-0.0788	U	1.07	1.07		0.881	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Uranium-235	-0.0259	U	0.0421	0.0422		0.423	pCi/g	12/02/20 14:03	12/23/20 10:18	1
Uranium-238	-0.0788	U	1.07	1.07		0.881	pCi/g	12/02/20 14:03	12/23/20 10:18	1

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# QC Sample Results

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40589-1  
SDG: D1189453

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID:** MB 160-490804/22-A

**Matrix:** Solid

**Analysis Batch:** 491746

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490804

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.1449		0.155	0.156	0.331	0.117	pCi/g	12/03/20 11:35	12/14/20 17:12	1
<b>Carrier</b>										
<i>Sr Carrier</i> 102      40 - 110      12/03/20 11:35      12/14/20 17:12      1										
<i>Y Carrier</i> 92.7      40 - 110      12/03/20 11:35      12/14/20 17:12      1										

**Lab Sample ID:** LCS 160-490804/1-A

**Matrix:** Solid

**Analysis Batch:** 491659

**Client Sample ID:** Lab Control Sample

**Prep Type:** Total/NA

**Prep Batch:** 490804

Analyte	MB	MB	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	%Rec. Limits
	Result	Qualifier									
Strontium-90	7.76		7.76	5.722	J	0.669	0.331	0.147	pCi/g	74	75 - 125
<b>Carrier</b>											
<i>Sr Carrier</i> 80.9      40 - 110      12/02/20 14:03      12/23/20 08:18      1											
<i>Y Carrier</i> 93.8      40 - 110      12/02/20 14:03      12/23/20 08:18      1											

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID:** MB 160-490768/1-A

**Matrix:** Solid

**Analysis Batch:** 492829

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490768

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier									
Actinium 228	-0.03808	U	0.0956	0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Actinium-227	0.08637	U		0.222	0.222	0.306	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Bismuth-212	0.3625	U		0.680	0.681	0.513	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Bismuth-214	-0.01490	U		0.0268	0.0268	0.158	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Cesium-137	-0.01957	U		0.0651	0.0651	0.0357	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Lead-210	0.2513	U	1.22	1.22		0.879	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Lead-212	-0.007941	U		0.0847	0.0847	0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Lead-214	-0.01332	U		0.0954	0.0954	0.0787	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Potassium-40	0.4500			0.537	0.539	0.339	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Protactinium-231	0.7858	U		0.759	0.763	2.03	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Protactinium-234	-0.09659	U		0.216	0.216	0.242	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Radium-226	-0.01490	U		0.0268	0.0268	0.200	0.158	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Radium-228	-0.03808	U		0.0956	0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thallium-208	0.03546			0.0510	0.0511	0.0192	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thorium 228	-0.007941	U		0.0847	0.0847	0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thorium-232	-0.03808	U		0.0956	0.0957	0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thorium-234	0.1218	U		0.618	0.618	0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Uranium-235	0.1931	U		0.260	0.261	0.218	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Uranium-238	0.1218	U		0.618	0.618	0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1	

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40589-1  
SDG: D1189453

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-490768/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 492822

Prep Batch: 490768

Analyte	Spike Added	LCS		Total		DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)	LOQ				
Americium-241	96.4	97.41		11.5		0.632	pCi/g	101	87 - 116
Cesium-137	26.7	29.43		3.09	0.0700	0.111	pCi/g	110	87 - 120
Cobalt-60	9.43	9.871		1.04		0.0464	pCi/g	105	87 - 115

Eurofins TestAmerica, St. Louis

# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

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Job ID: 160-40589-1  
SDG: D1189453

Rad

Leach Batch: 490566

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40589-1	HPPG-ESU-TU108B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 490768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40589-1	HPPG-ESU-TU108B-B-001	Total/NA	Solid	Fill_Geo-21	490566
MB 160-490768/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490768/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40589-1	HPPG-ESU-TU108B-B-001	Total/NA	Solid	DPS-7	490566
MB 160-490804/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490804/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

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# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40589-1  
SDG: D1189453

**Method: 905 - Strontium-90 (GFPC)**

**Matrix: Solid**

**Prep Type: Total/NA**

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40589-1	HPPG-ESU-TU108B-B-001	91.0	89.7
LCS 160-490804/1-A	Lab Control Sample	80.9	93.8
MB 160-490804/22-A	Method Blank	102	92.7

## Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier